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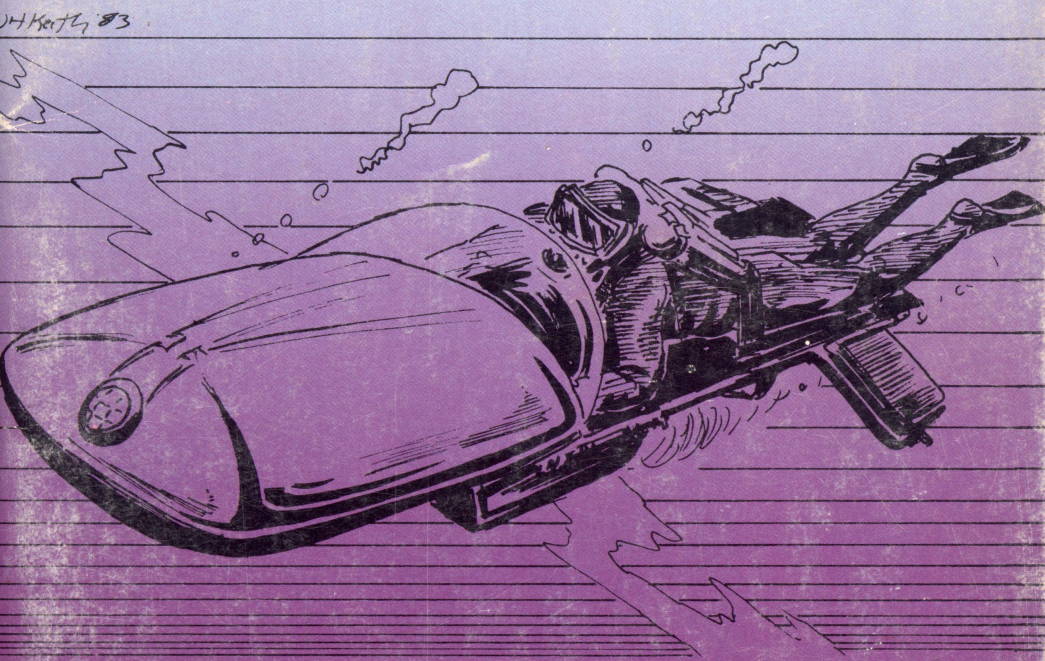
TRAVELLER®

THE UNDERSEA ENVIRONMENT

by J. Andrew Keith



Gamelords, Ltd.

THE UNDERSEA ENVIRONMENT

A Supplement for Traveller

by

J. Andrew Keith

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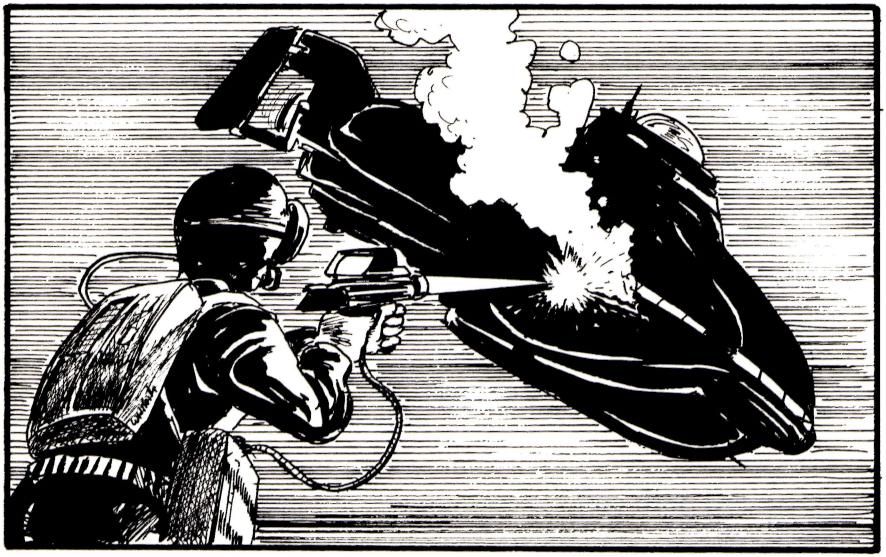
Introduction

The Undersea Environment is a supplement for **Traveller** dealing with the particular problems and methods for handling activity underwater. The material presented here should be used to expand, not replace, the normal **Traveller** rules. It provides guidelines which the referee may choose to apply at his discretion.

This booklet is divided into three major sections. The first, Rules, presents specific systems used to simulate underwater activities in game terms. The second, Equipment, gives information on equipment which may be of use in the undersea environment. Finally, the third section covers Special Encounters and Events which can take place underwater. These can be used by the referee in developing encounter tables for use underwater.



Except where specifically noted below, all normal **Traveller** rules and rulings are in effect. A listing of all skills contained in the **Traveller** rules and suggested modifications for underwater use may be found in the section Other Skills, below.

SKILLS

Two new skills, Swimming and Diving, are necessary for characters attempting activities underwater.

Many characters will be familiar with basic Swimming skills. Characters have an opportunity to begin the game with Swimming skill as a part of their background. As a general rule, roll 1D-3; the resulting number is the skill level held by the character in Swimming. A result of 0 indicates some familiarity, but no real expertise in Swimming; a result of less than 0 indicates a complete lack of skill.

An alternative system can be used when the specific characteristics of an individual's homeworld are known. Compare the planetary hydrosphere number with a roll of 2D-2. If the result is less than or equal to the hydrosphere, the character has been exposed to Swimming, and receives a skill level of 1D-1. A result greater than the hydrosphere figure indicates no familiarity with Swimming.

The character's Swimming skill may be increased over the course of the individual's career. Characters who serve in the Commandos (see Book 4, Mercenary) or in the Nautical Force Command (sailors, Supplement 4, Citizens of the Imperium) automatically have their Swimming skill level increased by one. Increases in Swimming skill may also be taken in lieu of a +1 Strength result, or instead of Survival skill, when these skills are rolled. The player has the option of announcing this any time such a result is achieved.

Diving skill is much less common than Swimming skill. Any character who has an initial skill level in Swimming of 3 or greater may also receive skill in Diving. A skill of Diving-1 may be earned by such a character if a throw of Social Level or less is make. Characters with a Swimming skill greater then 3 should receive a Diving skill of 1D-3 automatically, treated in the same fashion as the roll for Swimming skill discussed above.

Improvement in Diving skill may be earned by characters in the Nautical Force Command of the Commandos. Each term, a roll of 9+ gives the character a Diving skill increase of 1.

Finally, either Swimming or Diving skills can be developed through specific training, by any of the methods normally available in Basic Traveller or in Book 4, Mercenary. Diving skill has several special

limitations that should be considered. First, Diving skill may never be higher than Swimming skill; a character must be able to swim before he can learn to dive, and is always limited by the amount of expertise he has in Swimming. Secondly, characters learning to dive must receive practical experience. To receive Diving-1, a swimming pool or similar body of water is required; higher skill levels require the availability of larger bodies of water. This means that shipboard tutoring (or learning on a desert or vacuum world) will not be practical for the character seeking to acquire Diving skills.

General Description	Specific Game Effects
Swimming - The individual learns to swim, and can propel himself through the water with some rapidity.	Swimming skill is used by characters engaged in aquatic activities in much the same way that Vehicle skill is used in driving . . . as a modifier for avoiding or escaping hazardous situations. Specific rolls should be generated by the referee. The skill level in Swimming is used in determining a character's speed in the water (see page xx), and is also required as a prerequisite for Diving skill.
Diving - The individual is familiar with one of several forms of underwater diving techniques, and can function in the undersea environment.	Diving skill, when received, is taken as one of three specific skills - Free Diving, Scuba Diving, or Umbilical Diving. These are discussed further below. Skill levels in these areas are used as a DM to avoid specific dangers related to underwater activity. Skill in Diving also allows familiarity with specific types of diving equipment and systems.

Free Diving is an underwater activity in which the individual relies only on his or her own lung capacity for air, without artificial assistance. Examples of this type of diving include the primitive pearl divers of Earth history, and snorkeling. Characters learning to dive at Tech Level 2 or higher will be familiar with the use of basic skin-diving gear (snorkel, fins, and face masks) on a 2D roll of 5+. This is the only form of equipment available to Free Divers.

SCUBA (for Self-Contained Underwater Breathing Apparatus) Diving gives the diver artificial portable breathing gear which is carried by the individual making the dive. The skill cannot be picked up by any individual learning at a Tech Level of less than 5. Various specific systems are available at different tech levels; in general, a character will be able to qualify on only a few of these systems. Specifics are noted below.

Basic Swimming Gear	(Tech 2)	Automatic Qualification
Open-circuit SCUBA	(Tech 5)	6+
Closed-circuit SCUBA	(Tech 6)	8+
Artificial Gill	(Tech 8)	9+
Bionic Gill	(Tech 14)	10+

A roll to qualify on equipment may be made for each system listed (at the appropriate tech levels) each time Diving skill increases. When learning during a campaign, etc., specific equipment, if available, may be specified by the player.

Umbilical Diving relies on a line to a source of air away form the diver. Available at Tech Level 4 and up, skill in Umbilical Diving automatically grants familiarity with the appropriate equipment.

OTHER SKILLS IN THE UNDERSEA ENVIRONMENT

A character's ability to apply skills and expertise in the undersea environment will be somewhat hampered by his lack of familiarity with the medium. In general, all skills will fall into one of three basic categories, which are described below. A complete listing of all skills for **Traveller** (including not only the basic rules, but Books 4 and 5, Supplement 4, and Special Supplement 1 as well) is also provided. This list shows where each skill fits in the categories described. In a few special cases, more detail is given in pertinent rules elsewhere in this booklet; the reader is directed to the appropriate section as needed.

Normal Skills are those which are basically not altered by the undersea environment. In most cases, these will be skills of knowledge, for knowledge remains a constant.

Useless Skills, for the purposes of this booklet, are those which cannot be applied by a character underwater. If the player can justify both a need for, and a means of accomplishing, a task which calls for, say, Steward skill underwater, the referee is welcome to allow use of the skill . . . probably with adverse modifiers.

Modified Skills are those which are possible, but not as easy, to use while the character is working underwater. They are frequently skills of a practical nature, calling for manipulation or control which must be learned anew in underwater situations. Most skills which are modified underwater ignore modifications when the character has attained a proficiency of level 4+ in some form of Diving (since he or she is now skilled enough to deal effectively in the environment), but some, marked with an asterisk (*), are never free from this adverse modification.

Some skills require common sense to understand the reasoning for the effects assigned. Skills such as Piloting assume a ship is being piloted underwater (the pilot can be in a perfectly reasonable shirt-sleeve environment). Mechanical, Electronics, etc. assume that the work is being performed in the water. This dichotomy is important, and should be understood. The question of piloting a ship that is filled with water is a separate one that is far less likely to come up.

Specific modifications are given with the skill descriptions that follow. When skills from outside basic **Traveller** are given, their source is noted.

Skills

Administration: A Normal skill.

Air/Raft*: A Modified skill. An enclosed air/raft can be used underwater at skill level minus 1. Open air/rafts have a modifier of -2 to operator skill.

ATV*: A Modified skill. ATVs can be driven along a seabottom at minus 1 skill level. The referee should note that terrain on a seabottom will frequently be treacherous.

Battle Dress (Book 4, Mercenary): A Modified skill. Soldiers with Battle Dress skill apply a modifier of minus 1 underwater, unless they have a Diving skill of 4+.

Blade Combat: A Modified skill. Blade Combat skill is reduced by 2 levels in underwater situations, due to the hampering effects of a medium 90 times thicker than air. However, Dagger and Blade skills are reduced in efficiency only by 1 level.

Bow Combat* (Supplement 4, Citizens of the Imperium): A Modified skill. Few bows will work particularly well underwater. Those that do (generally crossbows) will function at a minus 1 skill level.

Brawling: A Modified skill. Brawling functions at a minus 1 skill level.

Bribery: A Normal skill.

Broker (Special Supplement 1, Merchant Prince): A Normal skill.

Carousing (Book 5, High Guard): A Normal skill, although it's hard to know how this would be applied underwater.

Combat Engineering* (Book 4, Mercenary): A Modified skill. Reduce the character's skill level by 2.

Communications (Book 5, High Guard): A Normal skill. See also the specific rules on underwater communications for special problems and limitations.

Computer: A Normal skill.

Demolitions (Book 4, Mercenary): A Modified skill. Skill levels are reduced by 1 underwater.

Electronics: A Modified skill. Reduce by 1 level underwater.

Engineering: A Modified skill. Reduce by 1 level underwater.

FA Gunnery (Book 4, Mercenary): A Useless skill. While artillery works underwater, the problems far outweigh the abilities of the characters to overcome them. Skill is therefore ignored.

Fleet Tactics (Book 5, High Guard): A Useless skill.

Forgery: A Useless skill. While knowledge of forgery techniques is a constant, it would take considerable justification to allow forgery to be carried out underwater. Besides, the ink would run.

Forward Observer: A Modified skill. Reduce skill by 1 level underwater. The rules on visibility must be carefully considered as well.

Gambling: A Useless skill, only because it is difficult to imagine a need

for it underwater (the dice would probably float, making it difficult to determine which face is up). Should there be sufficient reason, treat it as a Normal skill.

Gravitics (Book 5, High Guard): A Modified skill. Reduce skill by 1 level.

Gun Combat: A Normal skill. However, see the rules on combat underwater for modifiers which are applied in underwater situations.

Gunnery*: A Modified skill. Skill level is reduced by 1 underwater.

Heavy Weapons (Book 4, Mercenary): A Normal skill; see the rules on underwater combat for other modifiers.

Hunting (Supplement 4, Citizens of the Imperium): A Normal skill.

Instruction (Book 4, Mercenary): A Normal skill.

Interrogation (Book 4, Mercenary): A Normal skill.

Jack of All Trades: A Normal skill.

Leader: A Normal skill.

Legal (Special Supplement 1, Merchant Prince): A Normal skill.

Liaison (Book 5, High Guard): A Normal skill.

Mechanical: A Modified skill. Proficiency is reduced by 1 level underwater.

Melee Combat (Special Supplement 1, Merchant Prince): A Useless skill. Melee combat is not applicable in most underwater combat situations. The character may, however, be considered to have an equivalent level of Brawling skill for underwater combat purposes.

Navigation: A Useless skill. Starship Navigation is obviously impractical underwater, and the night sky is unavailable to give the character a reference point for planetary navigation. Characters may, however, surface to get rough (very rough - the direction of generalized heading is about the best that can be managed) navigational bearings from time to time.

Pilot*: A Modified skill. A starship being handled while underwater is a difficult thing to maneuver, and skill is reduced by 3.

Prospecting (Supplement 4, Citizens of the Imperium): A Normal skill.

Recon (Book 4, Mercenary): A Modified skill. Reduce skill levels by 2.

Recruiting (Book 4, Mercenary): A Normal skill.

Ship's Boat*: A Modified skill. Reduce skill levels for small craft being handled underwater by 1.

Ship Tactics: A Useless skill. Normal starship tactics do not adapt well to undersea situations.

Steward: A Useless skill.

Streetwise: A Useless skill. It is virtually impossible to imagine a situation requiring use of this skill underwater.

Survival (Book 4, Mercenary): A Normal skill.

Tactics: A Modified skill. The unfamiliarity of handling men in combat underwater causes a 1 level reduction in skill.

Trader (Special Supplement 1, Merchant Prince): A Normal skill.

Vacc Suit: A Normal skill. See the discussion in the section on Equipment, below.

Vehicle: The undersea environment affects Vehicle skill differently, according to the specific skill involved.
Air Craft (any): A Useless skill.
Grav Vehicle: As Air/Raft.
Tracked Vehicle: As ATV.
Wheeled Vehicle: As ATV.
Water Craft: A Useless skill, except for Submersible Water Craft skill, which is treated as a Normal skill.

Zero-G Combat: A Normal skill. Most of the techniques learned in this form of combat are applicable to underwater combat as well. However, until the character has had a chance to practice and develop confidence in the water, reduce the skill by 1 level.

Vehicle Functioning in the Undersea Environment

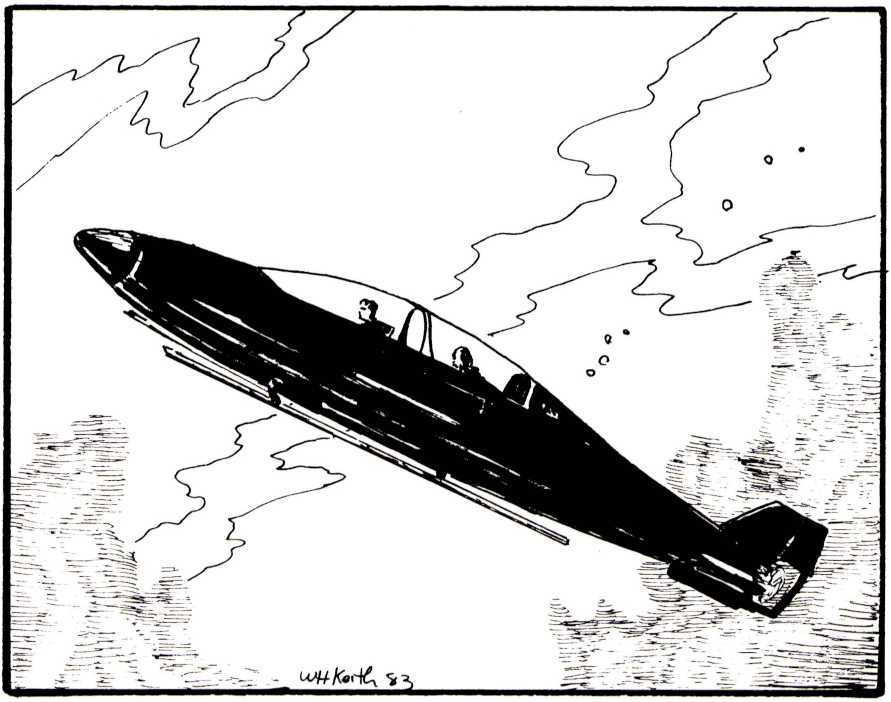
In the breakdown on skills above, the possibility of operating a variety of vehicle types is presented. Over and above the limitations of specific skills, there are certain important considerations that should be kept in mind when dealing with the actual functioning of vehicles underwater.

The use of tracked vehicles underwater is easily postulated. Undersea crawlers would operate very much like land based ATVs, and indeed, Tracked Vehicle or ATV skill would allow such vehicles to be operated. It should be noted that such vehicles would be specially designed for undersea use. Standard ATVs are usually designed for flotation in water, and few such vehicles would be normally found which could withstand very large pressure differentials.

The same is true of wheeled vehicles, with additional problems posed by the difficulties of traveling over the soft ocean bottom. Wheeled vehicles underwater will be, at the very least, quite rare.

There is no particular limitation to the operation of grav vehicles underwater. Two special considerations should, however, be kept in mind in this regard. First, a grav vehicle which is not air-tight will not operate for long before electrical systems short out (this is actually a condition under which all vehicles with electrical systems operate when underwater). Secondly, most grav vehicles are built for pressure differentials of a few atmospheres at most. Regard a 5atm pressure difference between interior and exterior as the maximum possible for that type of hull.

Specialty craft -- air craft and water craft -- are built for one environment only. Submersible water craft are the only kind which can



fare easily (or at all) in the undersea environment. Submersibles will vary in their ability to withstand deep dives; generally, the higher the tech level, the greater the safe dive depth allowed.

Starships, ship's boats, and other space-going craft are virtually unlimited in their ability to deal with pressure effects, and so can function normally.

SWIMMING

Movement in the water is governed by two major considerations - the character's Swimming skill, and the character's Endurance. Many factors may modify basic movement rates, such as currents, waves, and similar external influences. Basically, however, a character's movement through the water varies from a slow swim (5 meters per minute rounded down) to a fast swim (40 meters per minute plus 5 meters for each additional Swimming skill level). Characters who move at a rate of 20 meters per minute per level or faster should treat each minute of such movement as a "full swing" in combat - they are limited by Endurance in the number of minutes such activity can continue.

Characters may float or tread water without difficulty for a number of minutes equal to Endurance + Swimming skill; at the end of this period, a saving throw against Endurance must be made in order to continue the action. After each successful saving throw, Endurance is reduced by one

and the process repeats. A failed saving throw indicates that the character, tiring, can no longer continue, and must find another way to keep afloat.

Swimming Underwater: The speeds given for swimming above are reduced to 3/4 normal for characters swimming underwater, rather than on the surface, as is the speed given for endurance effects. Characters making Umbilical dives have their speeds halved.

Descents: Descents may be made at normal underwater speeds. An individual's buoyancy, however, may inhibit descent speeds. See the section on Bouyancy, below.

Ascents: A character may surface at normal speeds, possibly aided by bouyancy; characters making use of SCUBA gear should never ascend at a rate of greater than 20 meters per minute. To do so is to run the risk of severe damage to the body; damage amounting to 1-6 dice is taken each time the ascent rate is violated.

BOUYANCY

To determine bouyancy, a character's weight should be calculated. Weights will range from around 40 kilograms for an extremely light individual to perhaps 125 kilograms for fairly heavy people. The hypothetical "Average Man" will weigh between 70 and 80 kg. Equipment worn by the swimmer should be added to this weight. Normal carrying capacity rules should apply underwater.

The character's displacement, in kilograms, will be 80 + 2D. If the character and his equipment weigh less that this amount, then he is "positively buoyant" and will tend to float. "Negative buoyancy" occurs when the character weighs more than the displacement, causing him to sink. If the weight and displacement match exactly, there is "neutral buoyancy", allowing the character to move about freely.

When positive buoyancy occurs, the character will tend to rise at a rate of five meters per minute. This should count against descent speed, or be added to the speed of ascent. Characters with negative buoyancy sink at a rate of five meters per minute, which is similary combined with ascent and descent figures. Weights and Buoyancy Control Devices (BCD) are usually worn to aid a character in achieving neutral buoyancy.

FREE DESCENT DIVES

A character can hold his breath and perform activities underwater for a period of 15-second combat rounds equal to 1/3 of his endurance (round figures up). If a player disputes this figure, claiming a larger capacity, demonstration is recommended. One combat round of additional time is allowed for every level of Swimming and/or Free Descent Diving skill the character holds.

Using the speeds and times given above, a character may dive as deep and as often as he can. Dives to depths with pressures of more than 2 atmospheres (see Pressure, below), however, can result in severe damge to the lungs as a result of pressure effects. Each dive to such a depth

will result in 1 point of damage to Endurance on a die roll of 8+ for each .1atm descended below 2. If Endurance is reduced to half of total Endurance during a single day, Endurance is permanently reduced by one.

Another problem which may occur is anoxia. While holding his breath, a character can count on the normal capacity given above only as an average figure. The referee should secretly determine if the character runs out of oxygen sooner by rolling 7+. If this result occurs, the character has 1D-3 fewer combat rounds of capacity then normal, and will black out if he has not reached the surface by the time specified. This will necessitate rescue and possible resuscitation (roll 7+, DM-1 for each combat round before rescue) of the affected character.

PRESSURE

Pressure is not normally a problem to divers making free descents, except those who attempt unusually deep dives. For individuals using SCUBA or Umbilical systems, however, considerations of depth and pressure become extremely important.

Pressure effects underwater vary according to the atmospheric conditions and gravity of the specific world on which the dive is being performed. For this reason, most of the figures for depths used in this booklet are given in terms of absolute pressure, rather than distance. Absolute pressure is measured in atmospheres, abbreviated atm.

Thin or thin, tainted atmospheres have a sea-level pressure of between .50atm and .75atm. Any specific pressure desired may be chosen by the referee for color; this booklet assumes a sea-level surface pressure of .50atm. Equivalent pressures are found on Earth between 9,000 and 18,000 feet above sea level.

Standard or standard, tainted atmospheres have a sea-level pressure of between .75atm and 1.50atm. The Earth sea-level pressure of 1atm is used throughout this booklet for standard atmospheres.

Dense or dense, tainted atmospheres represent a sea-level pressure of 1.5atm to 2.0atm. The latter figure is used in this booklet.

Pressures can be calculated using the formula

$$P = A + (G_s \times d \times .1)$$

where A is the atmospheric pressure at sea level, G_s is the planetary surface gravity (calculated from **Traveller** Book 2), and d is the depth in meters of the point in question beneath the surface. For the convenience of referees and players needing a ready reference, a table of values for pressures at specific depths in a 1G field has been prepared. These values can be converted for other gravity fields according to the rules on Gravity, below.

The line at the bottom of the first section indicates the practical limit for free diving. The second line should be the practical limit for most SCUBA diving, and all dives at depths below that (the third section)

PRESSURE/DEPTH TABLE

Depth Meters	(Feet)	Pressure Thin	Standard	Dense
0	0	.50	1.00	2.00
3	9	.80	1.30	2.30
5	15	1.00	1.50	2.50
6	20	1.10	1.60	2.60
9	30	1.40	1.90	2.90
10	33	1.50	2.00	3.00
12	40	1.70	2.20	3.20
15	50	2.00	2.50	3.50
18	60	2.30	2.80	3.80
20	66	2.50	3.00	4.00
22	70	2.70	3.20	4.20
25	80	3.00	3.50	4.50
28	90	3.30	3.80	4.80
30	99	3.50	4.00	5.00
33	110	3.80	4.30	5.30
36	120	4.00	4.50	5.50
40	132	4.50	5.00	6.00
42	140	4.70	5.20	6.20
45	150	5.00	5.50	6.50
48	160	5.30	5.80	6.80
50	165	5.50	6.00	7.00
52	170	5.70	6.20	7.20
55	180	6.00	6.50	7.50
60	198	6.50	7.00	8.00
70	231	7.50	8.00	9.00
80	264	8.50	9.00	10.00
90	297	9.50	10.00	11.00

require decompression. The numbers show the pressure at the designated depths, in atmospheres, for each atmospheric type on which a dive may occur. As a note, referees conducting undersea adventures on worlds possessing exotic atmospheres should determine the pressure equivalent to simulate conditions properly.

GRAVITY

Gravity affects the depths at which pressures change. The table above uses a 1G field in designating specific depths; worlds with different gravity will have pressure bands correspondingly wider or narrower for each pressure figure. Pressure bands are the areas in which pressures alter gradually from one value to another and are of importance in calculating decompression information. On Terra, a change in pressure of one atmosphere requires a change in depth of 10 meters, so Terra's pressure bands are 10 meters wide.

Divide the depths given in the table by the planetary gravity given in the rules on starship combat (**Traveller** Book 2)

$$G_s = K \times \frac{D}{8}$$

where K is the density of the world (Terra-normal is 1) and D is the diameter, to yield the actual depth of each pressure band. For example, 10 meters depth on a Terra-normal (size-8) world would be equivalent in pressure to 13.33 meters on a size-6 world. Results approximate the values that would be found on individual worlds.

DECOMPRESSION AND DIVING

When diving under high pressures or for a long time, the necessity for decompression becomes important. Rapid changes from a high pressure to a low pressure can cause a bubbling of gas, particulary nitrogen, in the diver's blood and tissues, bringing on an attack known commonly as "the bends".

It must be remembered that the decompression tables presented on the following pages are approximations of real tables and are intended for purposes of simulation in game play only. They should not be used by players in real life situations, repeat,

SHOULD NOT BE USED BY PLAYERS IN REAL LIFE SITUATIONS.

To use the decompression tables, cross-index the greatest depth attained and the total amount of time spent in descent and on the bottom (referred to as "bottom time"). In all cases, use the next highest applicable figure on the table for time and/or pressure (e.g., 2.25 atm. is 2.33; 1 hour, 12 minutes is 01:20). The figure located is the total number of minutes that must be spent for all decompression stops in that sequence, followed by a letter denoting the decompression stop code. Dashes denote no decompression needed. Decompression stop codes are given in the table immediately below, with the portion of the total decompression time allotment to be spent at each level during the process of rising to the surface.

DECOMPRESSION STOPS

Code	1.66	2.00	2.33	2.66	3.00	3.33	3.66	4.00
A	All	-	-	-	-	-	-	-
B	2/3	1/3	-	-	-	-	-	-
C	3/6	2/6	1/6	-	-	-	-	-
D	4/10	3/10	2/10	1/10	-	-	-	-
E	5/15	4/15	3/15	2/15	1/15	-	-	-
F	6/21	5/21	4/21	3/21	2/21	1/21	-	-
G	7/28	6/28	5/28	4/28	3/28	2/28	1/28	-
H	8/36	7/36	6/36	5/36	4/36	3/36	2/36	1/36

n* Requires use of decompression chamber; character must spend "n" times bottom time in chamber to effect complete decompression and avoid decompression sickness.

DECOMPRESSION TABLES

Bottom Time (hh:mm)	Depth (in atmospheres) 1.66	2.00	2.33	2.66	3.00	3.33	3.66	4.00	4.33
00:05	--	--	--	--	--	--	--	--	--
00:10	--	--	--	--	--	--	--	--	--
00:15	--	--	--	--	--	--	--	--	--
00:20	--	--	--	--	--	--	--	--	--
00:25	--	--	--	--	--	--	--	--	2a
00:30	--	--	--	--	--	--	--	2a	5a
00:40	--	--	--	--	--	--	1a	9a	17a
00:50	--	--	--	--	--	1a	11a	20a	28a
01:00	--	--	--	--	1a	9a	18a	27a	39a
01:10	--	--	--	--	3a	15a	24a	39b	58a
01:20	--	--	--	--	8a	19a	33a	57a	78b
01:30	--	--	--	--	15a	24a	48a	78b	99b
01:40	--	--	--	1a	27a	34a	63b	99b	120b
01:50	--	--	--	4a	40a	49a	78b	120b	141b
02:00	--	--	--	6a	50a	60b	93b	141b	162c
02:20	--	--	--	11a	69b	86b	123b	180c	210c
02:40	--	--	--	22a	87b	105b	153b	228c	258c
03:00	--	--	--	30a	105b	148b	186c	276c	300d
03:20	--	--	1a	36a	123b	180c	216c	320c	350d
03:40	--	--	3a	41a	141b	204c	246c	360d	400d
04:00	--	--	7a	48a	159b	228c	276c	400d	450d
04:30	--	--	14a	62a	198c	276c	330d	495e	540e
05:00	--	--	22a	75b	234c	320d	390d	585e	630f
05:30	--	--	30a	90b	270c	360d	450d	672f	714f
06:00	--	--	38a	105b	306c	400d	510e	756f	812g
06:30	--	--	46a	120b	340d	440d	570e	840g	896g
07:00	--	--	54a	135b	370d	480d	630e	925g	972h
08:00	--	--	69b	168c	440d	570e	756f	2*	3*
09:00	--	--	84b	198c	500d	660e	882f	2*	3*
10:00	--	--	99b	222c	560d	750e	987f	3*	4*
11:00	--	--	114b	252c	620d	855e	2*	3*	4*
12:00	no decom limits		129b	282c	680d	960e	3*	4*	5*

REPETITIVE DIVE TABLES

00:05				0:10	0:20	0:30	0:40	0:40	0:50
00:10			0:10	0:30	1:00		1:20	1:30	1:40
00:15		0:10		1:05		1:20	2:00	2:30	3:20
00:20			1:00		1:50	2:00			4:50
00:25		1:00		1:50	3:00		5:13	4:50	8:00
00:30					4:00	5:15		8:00	12:00
00:40			1:50	2:50			8:20	12:00	
00:50	0:10	1:40			5:40	8:40	12:00		
01:00		2:40	3:10	4:30	8:40	12:00			
01:10	1:40	3:20			12:00				
01:20				6:00					
01:30		4:00	4:40						
01:40	2:40			9:15					
01:50			5:10	12:00					
02:00	3:20	4:30							
02:20			6:20						
02:40		5:10							
03:00	4:00		8:40						
03:20		5:40							
03:40			9:45						
04:00	4:25		12:00						
04:30		5:50							
05:00									
05:30									
06:00		9:15							
06:30		12:00							
07:00	8:00								
08:00	12:00								

DECOMPRESSION TABLES

Depth (in atmospheres)

4.66	5.00	5.33	5.66	6.00	6.33	6.66	7.00	7.33	7.66
--	--	--	2a	5a	10a	20a	30a	45a	60b
--	--	2a	4a	10a	20a	30a	45a	60b	99b
--	2a	3a	8a	20a	30a	45a	60b	96b	138b
2a	4a	6a	18a	30a	45a	63b	93b	135b	186c
5a	8a	12a	28a	45a	60b	93b	132b	180c	204c
9a	16a	23a	46a	60b	90b	129b	174c	198c	234c
25a	32a	37a	75b	90b	126b	168c	192c	228c	280d
36a	48a	63b	99b	123b	162c	186c	222c	270d	340d
56a	72b	87b	126b	156c	180c	216c	260d	330d	420d
72b	90b	102b	156c	180c	210c	250d	320d	410d	510e
87b	108b	132b	186c	204c	240d	310d	400d	495e	609f
111b	132b	153b	216c	240c	300d	390d	480e	588f	693f
129b	150c	180c	246c	310d	380d	465e	567f	672f	735f
150c	174c	204c	276c	390d	465e	555e	651f	714f	812g
174c	198c	228c	306c	465e	555e	630f	693f	784g	868g
222c	246c	280d	350d	525e	609f	672f	756g	840g	936h
270c	300d	330d	400d	600e	651f	735f	812g	900h	6*
310d	340d	370d	450d	651f	714f	784g	868g	972h	6*
360d	400d	430d	495e	714f	812g	868g	936h	6*	7*
400d	460d	510e	540e	812f	896g	936h	6*	7*	8*
450d	525e	546f	588f	896g	972h	6*	7*	8*	9*
570e	609f	651f	700g	972h	5*	6*	7*	8*	9*
651f	693f	756g	840g	5*	6*	7*	8*	9*	10*
735f	784g	840g	972h	5*	6*	7*	8*	9*	10*
868g	936h	972h	5*	6*	7*	8*	9*	10*	11*
936h	3*	4*	5*	6*	7*	8*	9*	10*	11*
3*	4*	5*	6*	7*	8*	9*	10*	11*	12*
3*	4*	5*	6*	7*	8*	9*	10*	11*	12*
4*	5*	6*	7*	8*	9*	10*	11*	12*	13*
4*	5*	6*	7*	8*	9*	10*	11*	12*	13*
5*	6*	7*	8*	9*	10*	11*	12*	13*	14*
5*	6*	7*	8*	9*	10*	11*	12*	13*	14*

REPETITIVE DIVE TABLES

1:00	1:20	1:40	2:00	2:30	3:00	3:30	4:00	4:30	5:00
			12:00	12:00	12:00	12:00	12:00	12:00	12:00
		12:00							
	12:00								
12:00									

For example, at 3.66atm and 5:00 hours, the listing is "290d". The "D" denotes 4 stops, at 2.66atm, 2.33atm, 2.00atm, and 1.66atm. The diver must spend 29 minutes (1/10 of 290 minutes), 58 minutes (2/10 of 290), 87 (3/10), and 116 minutes (4/10) at the stopping points, respectively. Otherwise, he will "get bent".

If decompression is not undertaken, signs of decompression sickness will appear within 2D x 2 minutes; this will also be the diver's damage period. The severity of the "bends" depends on the diver's bottom time in excess of the "no decompression" limits. For each 10 minutes of bottom time over the limit, the diver will suffer 1 point of damage at the end of each new damage period that passes. Damage stops when the diver is put into a decompression-recompression chamber.

Naturally, it is not necessary to decompress further than the surface atmospheric pressure. On a dense atmosphere world, for example, stops at 2.00atm and 1.66atm are not required.

REPETITIVE DIVES

Any time a diver makes more than one dive within a twelve hour period, nitrogen which has collected in his body during his previous dives will continue to be a factor in the diver's decompression needs during the new dives. The extremely intricate calculations that go into figuring decompression on such repetitive dives are omitted in this booklet; players or referees who are familiar with diving and wish to introduce this aspect of dives in detail should feel free to do so.

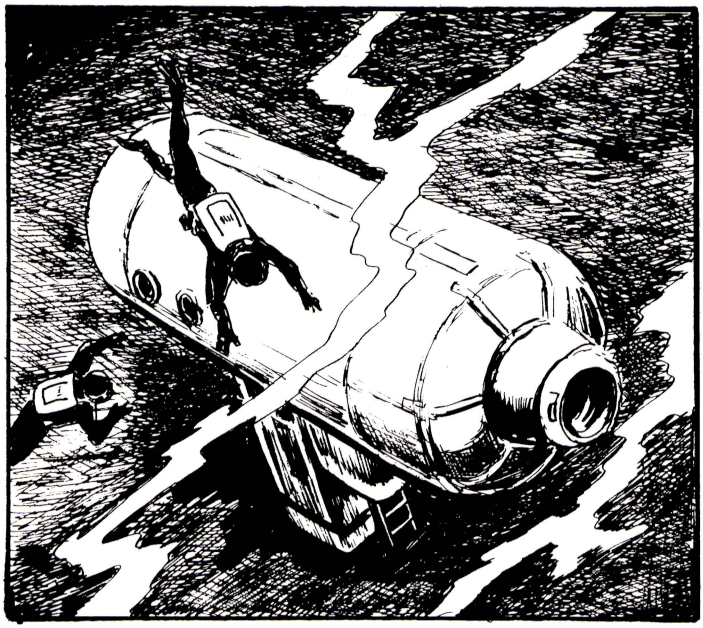
As a general rule, repeat dives are treated as if divers had already spent a certain length of time underwater. This will cut down the time they may spend on the new dive without decompressing, or push them into a longer decompression period.

The figure given in the Repetitive Dives table is the minimum amount of time spent out of water before the following dive may be considered a non-repetitive dive. If no time is given, move up the column to the nearest time. If a dive is repetitive, bottom time for the following dive will have added to it the proportion of the bottom time from the previous dive not cancelled by time spent out of water.

For example, if a diver is required to spend two hours out of water before diving again as a non-repetitive dive, and he spends only one hour on the surface, 50% of the total bottom time of his previous dive is added to the bottom time of his current dive. This process is cumulative for each repetitive dive.

HIGH PRESSURE OPERATIONS

It is theoretically possible for divers to operate regardless of external pressure (except with respect to nitrogen narcosis) - even at pressures of 10s or 100s of atmospheres. For operations of this type, divers are often based in a deep-sea facility which is constantly maintained under the same pressure as the water around them. They breath an oxy-helium mix in such conditions, and require vast amounts of



decompression time, but can function freely in the undersea environments at incredible pressures for as long as they need to.

As a general rule, twice as much time should be spent decompressing as was spent under pressure when returning divers from prolonged, deep water living conditions. Thus, a two-month tour of duty in a deep-water research station would require the character to spend four more months in a decompression facility, gradually adjusting to normal pressures.

TANK PRESSURE

As a diver's depth increases, the increased pressure around him causes the volume of air in his tank to decrease. Because of the physical laws controlling the partial pressures of hoses and the makeup of the human body, individuals breathing this compressed air require the same volume as always - even though the equivalent volume of air deep underwater holds many times the actual number of molecules a person would breath taking a lungful of air on the surface.

Because of this, the air tanks rated for one hour of use on the surface will not last as long underwater. Tanks are always rated by the amount of time they will supply air at 1atm. Divide that rating by the current pressure in atm to show how long the tanks will function at a specific depth. For prolonged dives, time should be tracked carefully, and the available oxygen supply tracked along with it. For instance, a character begins a dive carrying a tank rated for one hour at 1atm. She swims 15 minutes at 1atm, then dives to 2atm for 10 more minutes. When this time is up, she has actually used over half of her air. In terms of 1atm use, she used 35 munutes of her hour's supply. If she returns to 1atm, she has 25 minutes of air remaining; at 2atm, she has 17 1/2 minutes

more. A deeper dive, to 3atm, would allow only about 11 minutes of diving.

Most tanks (all but the cheapest models) include a reserve air supply rated at 12 minutes in 1atm. The reserve may cut in automatically (triggering a warning indicator to alert the diver) or require manual activation. In either case, a return to the surface will be required quickly. Note that a seemingly exhausted tank will actually have a few breaths remaining in it, which become available as pressure decreases.

OXYGEN USE

Heavy physical activity forces an increase in oxygen use. Each time a character makes the equivalent of a full combat blow (either in combat or through fast swimming), an extra minute of air is used. This is counted as a minute of air at current pressure levels (so, at 2atm, two minutes of the total 1atm air supply are expended).

NITROGEN NARCOSIS

When diving with conventional oxygen-nitrogen gas mix, divers may be subject to nitrogen narcosis on deep descents. Nitrogen narcosis is a phenomenon that causes a diver to behave as if he had consumed large quantities of an intoxicating beverage.

At a pressure of 3 atm, the effects of nitrogen narcosis begin to set in. Referees should treat the hazard as a form of "wounding" which simultaneously affects Endurance and Intelligence. When a **rapidly** descending diver reaches 3atm, one hit is inflicted on each of these areas. An additional hit is inflicted each time the diver adds an additional 1/2atm to his depth. Thus, at 6atm, 5 hits have been inflicted.

When either Endurance or Intelligence reaches 0, the diver is unconscious. The real danger of nitrogen narcosis, however, is its effect on judgment. While under the effects of nitrogen narcosis, the player must roll 2D for a result less than or equal to Intelligence in order to have the character complete even the simplest of tasks. Repeat tries are allowed, one each combat round in most cases. Failure of the roll indicates that an error in judgment has caused trouble for the character attempting the action. At very high pressure nitrogen narcosis does not count as normal wounds; a character still has his full Endurance for all purposes even during a deep dive. Recovery from the effects of nitrogen narcosis is automatic and instantaneous as the diver ascends to lower pressures. As soon as an ascent is made to a point of less then 3atm pressure, the effects vanish totally.

A character with a Diving skill of 2 or higher might realize that he is under the influence of narcosis by sucessfully making a 2D roll against Intelligence. Those with lower skill ratings would know on a 3D roll against Intelligence. Once a character realizes that he is 'narked', he can relieve the situation by ascending until the effects are gone, then descending again slowly. Nitrogen narcosis gets worse as descent rate increases, and can be avoided by descending at less than 1atm/minute once below the 3atm level.

It is important for the referee to handle the effects of nitrogen narcosis secretly. The effects of narcosis are subtle and slow to materialize fully. Realization that nitrogen narcosis is causing problems will come quickly to players with an understanding of diving; the referee, however, should use rolls against Intelligence to regulate character understanding of the situation. A decision to ascend above the effects of narcosis is a task, like any other, which may be affected by narcosis.

VISIBILITY AND SOUND

The undersea environment has special effects on light and sound waves. These can influence underwater activities in various ways.

Refraction takes place when items in the water are viewed from air - as through a face mask, and causes objects to appear to be both larger and closer than they actually are. A DM of -1 is applied to all rolls to hit when attacking underwater. The properties of water should be kept in mind by the referee in non-combat situations as well.

Visibility in clear water is generally reduced to 75 meters. An object at greater range will be visible only if it is fairly large. Specific conditions may vary considerably; the referee may choose to extend sighting ranges in some instances. Rough water conditions, sandy or silty bottoms, and other conditions can reduce visibility to near zero.

Colors are affected by distance from the light source. Certain wavelengths of light are absorbed quickly in passing through water. At distances greater than 6 meters, reds are indistinguishable; orange and yellow fade out at around 12 meters. Blues are discernable at distances over 30 meters.

Visibility figures here assume an availability of natural light, either filtered sunlight, a major source of natural phosporesence, or artificial light. During the day, sunlight will provide illumination only to about 100 meters depth; below this point, an alternate light source is required. At night, no surface light penetrates to any significant depth.

The referee will do well to keep these factors in mind when describing scenes underwater.

Sounds underwater are transmitted farther and faster than in the air, but are quickly scattered. For this reason, a loud noise (say a knife pounded against an air tank) can be heard for a long distance, facilitating the use of audial signals. In bad visibility, however, sources of such sounds are not easy to locate, since the sound waves scatter so quickly.

COMBAT UNDERWATER

In addition to the DM caused by refraction and the range modifications, the undersea environment has other effects on combat. Gunpowder weapons function with a DM of -3 to hit; archaic gunpowder weapons (those which do not use a sealed cartridge) do not fire at all. Laser weapons are, for all practical purposes, ineffective at distances greater than 3 meters, and have a DM of -1 to hit and damage reduced by 2 even in that range.

Melee weaponry suffers a DM of -1 to hit, due to the density of the water. This modifier is also used in resolving attacks with spearguns and similar weapons.

The referee should always use common sense in applying weapons modifications.

UNDERWATER COMMUNICATIONS

Though sound carries well underwater, it is quickly distorted beyond recognition, making it useless for complex communications. Most other forms of communciations are equally limited.

Radio waves carry no more than 30 meters before being scattered, and thus are of limited use in deep water. For subsurface-to-surface transmisions, it is necessary that the surface station run a receiver/transmitter into the water, connected by cable to the radio proper, in order to penetrate the air/water interface. Without such arrangements, signals are rarely capable of being exchanged from one medium to the other.

Maser communications (discussed in Striker) are effective to no more than 300 meters. Lasers can be used to carry communciations to no more than 30 meters. Highly sophisticated meson communication systems are not affected by water, but are non-portable, and thus do not fall within the sphere of diving communications systems.

TEMPERATURE

Dives in cold water can be very dangerous. Water is an excellent conductor of heat, and can lower a diver's body temperature significantly.

For example, when diving without protection in water at a temperature of 10°C (50°F), a diver loses one point of Endurance every ten minutes. At 5°C (40°F), however, this loss is increased to one point per minute. Colder temperatures are correspondingly more severe in their effects.

Protective clothing can offset the effects of immersion in cold water. A table showing the (unprotected) Endurance loss at various temperatures follows.

TEMPERATURES

Temperature °C	(°F)	Rate of Endurance Loss
20	(70)	Lose 1 Endurance point every hour.
15	(60)	Lose 1 Endurance point every 30 minutes.
10	(50)	Lose 1 Endurance point every 10 minutes.
5	(40)	Lose 1 Endurance point every minute.
0	(32)	Lose 1 Endurance point every 30 seconds.
-5	(25)	Lose 1 Endurance point every combat round.

Centigrade to Fahrenheit conversions have been rounded off. The centigrade figures are considered as accurate, the Fahrenheit equivalents approximate. The referee is responsible for setting the basic water temperature.

CONCUSSION AND SHOCK UNDERWATER

The dense liquid medium of the undersea environment transmits shocks to great distances, and underwater explosions are a severe hazard. When an explosion is set off underwater, blast effects are transmitted outward in a spherical fashion around the impact point.

When using basic **Traveller** rules, the full effect of a blast (i.e., the full number of dice thrown for damage) will be suffered by anyone within Close or Short range (up to 5 meters away). Half the given damage dice are thrown for characters at Medium range (up to 50 meters). This damage is caused by concussion, and is automatic - no "to hit" throw is made. All characters, animals, and objects are affected.

Referees using Striker rules should double the given "burst radius" for a given explosion and use this as the basis for calculation of concussion effects.

It should be remembered that explosions radiate in three dimensions. The difference in depth between an explosion and a character in the water should be determined. Using the conversion rates

of basic **Traveller,** determine the vertical range between the explosion and the target, as well as the horizontal range. The greater of these two is used for determining concussion damage.

SPECIAL SCUBA RIGS

The rules which have hitherto been presented relate to the use of standard SCUBA gear utilizing an oxygen-nitrogen air mix. Other types of equipment are available, usually of limited availability and/or higher price.

Tanks using a different gas mix - usually oxygen-helium - are often used to eliminate some of the dangers associated with deep diving. Ues of the oxy-helium eliminates the threat of nitrogen narcosis, and reduces the problems of decompression somewhat. Times given on the decompression tables for allowable bottom time should be doubled when using these rigs.

Close-circuit SCUBA (also known as the oxygen rebreather) is a system which recycles oxygen from exhaled carbon dioxide. All normal pressure effects are present; the only differences allowed by the rebreather are the lack of tell-tale air bubbles, and an extension of the available air supply above standard SCUBA. The system is often used in commando operations. Close-circuit SCUBA is extremely tricky to handle; see the section on Equipment for details.

The artificial gill is a device which extracts oxygen from surrounding water. A supply of nitrogen or helium is still carried, for mixture with the oxygen thus acquired. Pressure effects are still of importance, but the character's supply while using the unit is virtually unlimited. Some danger does occur in areas where the amount of oxygen in the water is too low to support life; see the sepcific description of equipment. There are several variations to this basic concept.

At very high tech levels, introduction of a bionically implanted gill allows characters to survive underwater by actually "breathing" water. All problems of pressure and air supply are eliminated at this point, but the equipment is extremely expensive and difficult to obtain.

UMBILICAL DIVING

Diving with umbilical gear is not unlike SCUBA diving in most particulars, but the freedom of diving range and movement is, of course, hampered by the length of the umbilical line (which can be linked to the surface or to an underwater base or vehicle). The rig requires at least one person on the surface to handle the air compressor that feeds air to the diver; this individual should have either umbilical diving or mechanical skill.

Pressure effects should still be taken into account with umbilical diving, though air supplies are virtually unlimited. Special hazards accrue from the possiility of having an umbilical line severed during the course of the dive.

Equipment

The equipment presented in this section covers a broad range of functions and abilities. Characters planning underwater activities are advised to carefully weigh their needs, and choose the best possible equipment for the job to be done.

BASIC SKIN DIVING GEAR

This gear embraces the face mask, snorkel, swim fins, and weight belt used in skin and SCUBA diving. At Tech Level 2, such material is likely to be of a somewhat improvised nature. By Tech Level 6, the familiar forms of all these pieces of equipment is reached.

Snorkel: A snorkel is a small tube which permits the diver to submerge completely but continue to breathe as long as the end of the snorkel is above water. There are many sizes of snorkels, but these are all under 40 cm tall; once a snorkel gets past that length, the air exchange is not sufficient to support the diver. Weight is 100 grams; price is CR 5.

Face Mask: Various types of masks are available; they permit clear vision underwater. Characters without masks suffer from even more serious handicaps in vision than are outlined in the previous rules on visibility underwater; the referee should act accordingly. In addition, if it is determined that chemicals in the water are particularly irritating or dangerous (the effect of pollutants, an atmospheric taint, or some other condition imposed by the referee), a mask is necessary to prevent damage to the eyes.

The simplest types of face mask range in price from CR 10 to CR 30, and weigh 250 grams. More sophisticated models, rigged for full head coverage to permit the use of a radio or other special gear, appear at Tech Level 7, cost CR 50 to CR 100, and weigh up to 500 grams.

Swim Fins: Fins increase the diver's speed in the water. When using fins, a character sets a movement rate (as discussed in the rules on movement), but the actual speed achieved is calculated as if the character's level of Swimming skill is 1 higher than shown. Thus a slow swim by a character with Swimming-3 is usually 5 meters per minute; with fins, he moves 10 meters per minute without suffering any Endurance loss. A set of fins weighs 500 grams, and costs CR 15.

Weight Belt: A weight belt is designed to hold weights used to compensate for buoyancy. Primitive gear usually makes use of "found" weights (stones, etc.); actual weight belts with provisions for adding and subtracting specific amounts of weight cost CR 25. Weight of the belt is negligible; the actual attached weights will cause it to vary in its effective weight. See Buoyancy rules.

EXPOSURE SUITS

Wet Suit: A nylon-lined, foam-insulated neoprene outfit designed to reduce the effects of cold water. Water is permitted to soak into the suit, but the insulation is designed to keep heat loss from becoming a problem. Several types are available.

Standard Wet Suit (Tech Level 6): Raises the exposure time in cold water by three levels; thus 0°C is treated as 15°C for purposes of endurance loss. Weight is 1 kg (ignored when worn); cost is CR 60.

Light Wet Suit (Tech Level 7): Raises the exposure time in cold water by two levels, thus 0°C is treated as 10°C. Weight is negligible; cost is CR 40.

Advanced Wet Suit (Tech Level 8): Raises the exposure time in cold water by three levels (like the standard wet suit). Equivalent to jack armor for protection. Weight is negligible; cost is CR 75

Cold Water Wet Suit (Tech Level 7): Designed for diving in extreme conditions. Exposure time in cold water is raised by four levels; 0°C is treated as 20°C. Equivalent to jack armor. Weight is 2 kg (negligible when worn); cost is CR 100.

Dry Suit (Tech Level 7): The dry suit, unlike the wet suit, is a completely watertight garment. Because of this, the dry suit is considerably warmer since cold water is not circulating through the suit. Wearing clothing under the dry suit is possible and will improve in insulating potential by one factor, but this will also further reduce movement. If the suit is ever torn, however, the insulation value will be reduced to that of a poor wet suit within 1D combat rounds. Exposure time in cold water is raised by six levels; 0°C is treated as 30°C. The dry suit has one additional advantage in that a bouyancy control device is not needed since the entire suit can be used as one. Weight is 3 kg; cost is CR 300.

Heated Dry Suit (Tech Level 8): An advanced exposure suit, the heated dry suit utilizes heating coils built into the suit proper to heat the diver. While wearing the suit with the heaters in operation, exposure rules are completely ignored.

Disadvantages of the suit include the extreme I/R signature, which makes detection of a diver extremely easy, and the possibility of a short circuit when the suit is damaged. Any time the suit is hit and penetrated, first roll 10+ for a short circuit, which causes the diver 4D damage; then reduce the suit to a normal wet suit for protection in 1D+3 combat rounds.

The Heated Dry Suit is treated as a Dry Suit when power is off. Batteries, worn in a belt pouch, provide 6 hours of operation before recharge or replacement becomes necessary. Available at Tech Level 8, the suit is of negligible weight, provides protection as jack armor, and costs CR 650. An improved model, available at Tech Level 10, does not short circuit when penetrated, and the batteries last 12 hours.

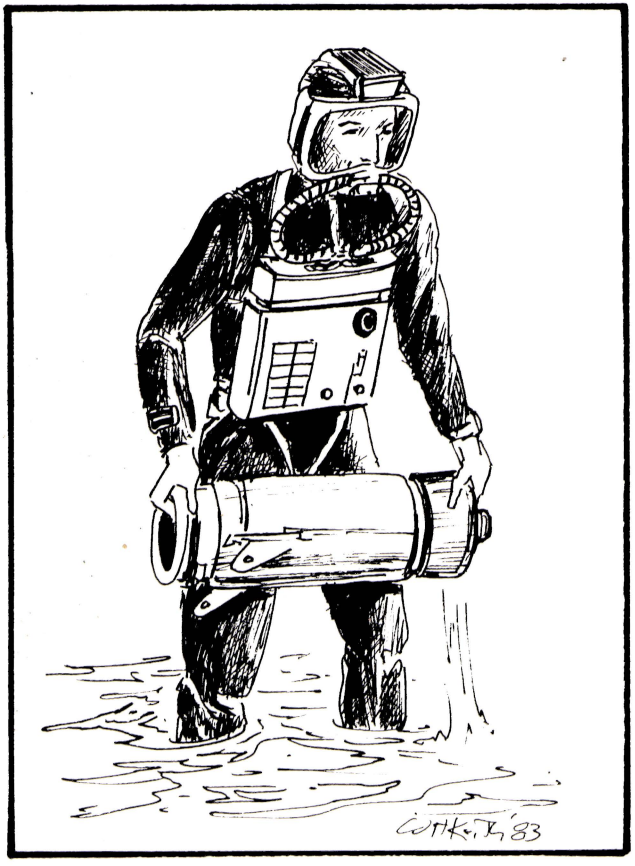
Underwater Air Tanks: Tanks include a regulator and breathing connections. They come in several sizes, based on the charge of air they can hold, and can be worn in configurations of up to three tanks at a time.

The following is a list of available tanks by time rating (at 1atm), weight (charged), cost, and Tech Level.

AIR TANKS

Time	Weight	Cost	Tech Level
1 hr.	1.5kg	CR 350	6
2 hrs.	2.0kg	CR 375	6
3 hrs.	2.5kg	CR 400	6
4 hrs.	2.5kg	CR 500	8
5 hrs.	2.0kg	CR 800	9

Tanks must be charged with a gas mix. Air (oxygen-nitrogen) refills cost CR 4 per hour of breathing time at 1atm. A sophisticated oxy-helium mix costs CR 25 per hour of breathing time. Refills require access to air



compression equipment available at Tech Level 5 and over. Oxy-helium refills are not available unless Tech Level 7 equipment is used, and may be subject to limited availability (at the discretion of the referee).

Oxygen Rebreather: A close-circuit SCUBA system which uses a chemical charge to absord exhaled carbon dioxide and reclaim oxygen. The system functions for 6-8 hours before a fresh charge of chemicals is required. The exact time will be 6 hours plus 1D x 20 minutes. There is little advanced warning of exhaustion of the chemicals, and dives of longer than 6 hours are risky.

The delicacy and complication of the rebreather apparatus makes it prone to mishaps. Once every hour, the referee should roll a 7-, DM + diving skill, DM + Tech Level-8, for a mishap to occur, resulting in failure of the unit.

The rebreather has the advantage of giving off no tell-tale bubbles, and thus is frequently used for commando and covert operations. Available at Tech Level 8, the rebreather weighs 4 kg and costs CR 2,000. A charge of chemicals costs CR 100.

Artificial Gill (Tech Level 8): Designed to extract oxygen from water, the artificial gill is a complex device which allows a virtually unlimited time underwater. A tank included in the mechanism carries a charge of nitrogen or helium, which is mixed with extracted oxygen. Exhaled carbon dioxide is eliminated, with the helium or nitrogen being recirculated. Some models have CO_2-absorbant chemicals, like a rebreather, to eliminate bubbles for covert dives.

The two chief dangers involved in using the artificial gill are anoxia and hypoxia.

Anoxia occurs in some layers of water where oxygen content is too low to allow extraction. This is normally a rare occurrence, implemented as an event at great depths or under special circumstances. Victims of anoxia must be given air within five minutes, or they will probably die.

Hypoxia occurs when a fault in the mechanism delivers an insufficient volume of the mix gas (nitrogen or helium) to the diver. Shots of pure oxygen have an intoxicating effect, and should be treated much like nitrogen narcosis (treat a 15-second combat round of hypoxia as a .5atm increase in pressure in terms of narcotic effect). Hypoxia is based on the reliability of the gill. Basic chance of a mishap is equal to the tech level of the device (8+ for Tech 8, 10+ for Tech 10, etc.), plus the diver's Diving skill (skill of 3 plus Tech 8 = reliability of 11), minus any damage due to abuse or attack. If a total malfunction of the mix occurs (reliability die roll missed by 4 or more), the diver will receive pure oxygen, which at depths greater than 2atm is a deadly gas. If breathed for more that 1D-2 combat rounds, it may result in the death of the diver.

The artificial gill functions only in thin, standard, or dense atmospheres (types 4-9). Weight is 4 kg, cost is CR 4,000. Absorbent chemicals for CO_2 are available as for the rebreather.

Powered Gill (Tech Level 12): A variant of the artificial gill, the powered gill is similar in function but quite different in actual design. Using a power pack to provide the high levels of energy required, the

powered gill converts water to hydrogen and oxygen, expelling the hydrogen and combining the oxygen with a carried nitrogen supply.

The powered gill has all of the same basic limitations as the artificial gill, though it is lighter. Power supply is good for 36 hours of use between recharges.

Weight is 3 kg, cost is CR 5,000. Bubbles (from hydrogen, broken down by the unit) cannot be masked.

Powered Gill (Tech Level 13): A refinement of the standard powered gill, this miniaturized version employs the same principles, but is much smaller. It consists of a lightweight, mouthpiece-type breathing device with a small battery and a container of pressurized nitrogen attached to the unit. The unit will not accept helium, and thus is limited by the threat of nitrogen narcosis to pressures of 3atm or less. Total operating time is no more than 1 hour.

Other charactersitics are as given with the powered gill and the artificial gill. Weight is 500 grams, and price is CR 7500.

Bionic Gill (Tech Level 14): A surgical implant device which enables the human body to function freely in the undersea environment. The individual breathes water as freely as air using a small (1 kg) intake device which is tied to the implant when a dive is made. The lungs are filled with water to equalize pressure, though water is not actually "breathed" through the lungs.

The chief danger of the bionic gill is a problem in adjusting from one environment to another; water trapped in the lungs upon resumption of air breathing can be a threat. It is primarily controlled through experience. Each time a dive is made, a 1D throw of less than diving skill is required to avoid this mishap. If the throw is not achieved, the character takes 2D damage.

The bionic gill costs CR 30,000 to purchase and implant. Once installed, it is of negligible weight. The intake unit costs CR 5,000.

SUPPORT EQUIPMENT

Depth Gauge: A devise for registering the pressure of the water around the diver. Several models are available, varying in accuracy and in special features.

The simplest types of gauge register pressure only (forcing the diver to be familiar with the pressure/depth relationship for the specific planet). These range in price from CR 5 to CR 50, and vary in reliability according to price. Very cheap models can be more dangerous than useful, since readings may be off considerably. These are available at Tech Level 6.

Of similar quality and price are gauges manufactured for diving on a specific world, which calibrate depth in meters (or other, local measurements) rather than by pressure. In addition to concerns over reliability, characters should be aware of the danger of diving with a depth gauge calibrated for a different planet. Any Tech Level 6 world can provide these.

A more elaborate model of depth gauge is a digital unit that records time as well as pressure, and specifically processes information on

decompression stops and durations. Prices on this type of gauge are in the CR 100 to CR 250 range. They are available at Tech Level 8.

Most sophisticated of all is a device which can be programmed to show pressure, decompression data, and depth in meters for any world, merely by making some simple entries before diving. This unit, available at Tech Level 9, is usually priced in the CR 200 to CR 300 range.

All depth gauges are of negligible weight, are worn on a wrist mounting and usually require occasional battery charges for power.

Tank Pressure Gauge: A gauge showing the available air supply left in air tanks. A basic model shows this information in terms of 1atm air supply (forcing the diver to convert for current depth); an advanced version can be tied in with a programmable pressure/depth gauge to give readouts of actual air supplies at specific depths. Weight is negligible, prices range from CR 5 to CR 50.

Echo Sounder: A device which sends out a pulse of high-frequency sound, then reads returning echoes to give a range between the sounder and any obstruction. Low-cost models are usually effective to no more than 80 meters, and at ranges of over 40 meters have little accuracy. More sophisticated models (available at Tech Level 7+) are capable of showing a fairly detailed display of the area at which they are aimed, including registers of schools of animal life and other details.

Echo sounders are usually mounted aboard boats and submersibles, where they serve as depth finders. Portable models, however, can be mounted in waterproof camera housings (see below) and used by divers. They not only determine depth, but also can be used to find horizontal ranges.

Units weigh 1 kg, with costs ranging from CR 50 to CR 300. Price determines both versatility and reliability,. First available at Tech Level 6.

Waterproof Camera Housing: A carrying case which can be used to house cameras or delicate instruments which cannot be exposed directly to water. The housing adds 500 grams to the weight of the device being carried, is available at Tech Level 6, and cost is equivalent to the item being protected.

Buoyancy Control Device: An inflatable vest which is used to control a diver's buoyancy and can hold his head completely out of water when fully inflated. Note, the BCD should not be used to lift objects out of the water since if the object is dropped, the diver will suddenly become very buoyant and will move to the surface at great speed, possibly suffering from the effects of too quick an ascent; for lifting objects from the water, a lift bag should be used (see below). The BCD, when used as a life vest, can hold a diver up as long as it remains inflated, without any effort on the diver's part. The BCD can be inflated orally; or, with a special hose attachment, from the air tanks; or, in an emergency, with a CO_2 cartridge. It has a negligible weight, is available at Tech Level 6, and costs CR 45.

Lift Bags: A lift bag is basically an underwater parachute that is tied to an object and filled with air to lift the object to the surface. Weight

of the lift bag is negligible, but bags with greater than 100 kg lift are bulky. Cost of the lift bag is CR 10 for each 25 kg of lift.

Bangstick: A short pole tipped with an explosive cartridge, used to discourage underwater predators. Use of the bangstick requires a fencer's thrust to set off the charge against the hide of the predator. Each stick is good for one attack before reloading which takes one combat round.

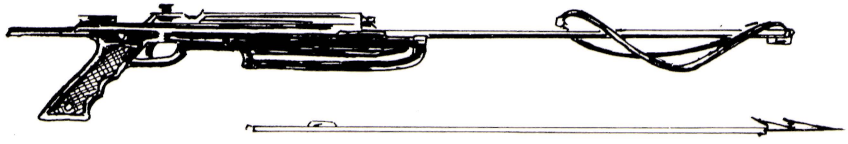
The bangstick is 1 meter in length, weighs 250 grams and costs CR 20. Ammo price is as given for shotgun shells. This weapon is available at Tech Level 5.

Electric Prod: A hand weapon which delivers a powerful charge of electricity when brought into contact with a target. Used to ward off large predators, the electric prod is a pole with batteries in the handgrip, and discharges when touched against its target. It is easier to use than the bangstick since only a touch is needed, and the prod doesn't do physical damage to the beast which could result in the drawing of other predators.

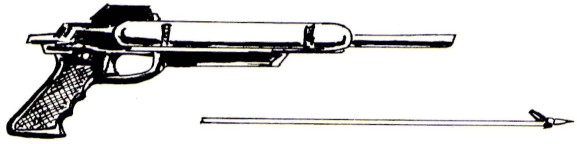
The electric prod is 500 mm in length, weighs 250 grams, and costs CR 75. Replacement batteries (good for 10 discharges) weigh 25 grams each (two are required for operation), and may be changed in one round. They cost CR 10 each. Electric prods are available at Tech Level 7 and up.

Hand Spear: A hand-carried spear (with an optional harpoon tip) used for undersea fishing. Similar in size and weight to a bayonet, it has slightly different combat characteristics. It is available at Tech Level 1, and costs CR 10.

Sling Speargun: Similar in principal to the crossbow or slingshot, the sling speargun is a slightly longer-ranged undersea weapon than the hand spear. Available at Tech Level 3, it consists of a tube, a rubber or elastic sling, and the spear itself. Sling spearguns weigh 500 grams, and cost CR 50.



Gas Spear Gun: An undersea weapon using compresed air or CO_2 gas to fire a spear, the gas spear gun is available at Tech Level 6. It weighs 1 kg (spears weigh 250 grams each), measures 500 mm, and costs CR 125. Extra spears (including compressed gas cartridges for firing) cost CR 20 each.



WEAPONS AND EQUIPMENT

WEIGHTS AND PRICES

Item	Base Weight	Length Overall	Base Price	Tech Level	Reload Weight	Reload Price
Hand Spear	250gm	200mm	CR 10	1	—	—
Sling Speargun	500gm	200mm	CR 50	2	250gm	CR 10
Gas Speargun	1000gm	500mm	CR 125	6	250gm	CR 20
Bangstick	250gm	500mm	CR 20	5	750gm*	CR 10
Electric Prod	250gm	400mm	CR 75	7	25gm@	CR 10

* There are 10 reloads to a package. @ 2 batteries are required for use.

WEAPONS TABLE

Attacker's Weapon	Required Strength Level	DM	Advantageous Strength Level	DM	Weakened Blow or Swing	DM	Required Dexterity Level	DM	Advantageous Dexterity Level	DM
Hand Spear	6	-2	10	+1	-3		—	—	—	—
Sling Speargun*	7	-1	9	+2	-2		7	-2	9	+1
Gas Speargun	—	—	—	—	—		7	-2	9	+1
Bangstick	5	-2	9	+1	-2		—	—	—	—
Electric Prod	4	-2	9	+1	-2		—	—	—	—

* Treat this weapon as a bow weapon for combat. See Supplement 4, Citizens of the Imperium, or Snapshot for details.

WEAPONS MATRIX

Attacker's Weapon	Defender's Armor: Nothing	Jack	Mesh	Cloth	Reflec	Ablat	Battle
Hand Spear	+1	0	-2	-2	-1	-3	-6
Sling Speargun	+1	+1	-1	-1	+1	-2	-5
Gas Speargun	+1	+1	-1	-2	+1	-1	-5
Bangstick	+3	+3	-2	-3	+3	+1	-5
Electric Prod	+5	+2	+2	+2	+4	+2	-3

RANGE MATRIX

Attacker's Weapon	Range: Close	Short	Medium	Long	Very Long	Wound Inflicted
Hand Spear	+1	+1	no	no	no	2D
Sling Speargun	+1	+1	-4	no	no	2D
Gas Speargun	+1	+2	-4	no	no	3D
Bangstick	+1	+1	no	no	no	2D
Electric Prod	+1	+1	no	no	no	4D

Note: The information given here assumes use of the weapons out of the water. Further DMs for underwater combat should be applied as specified in the rules section.

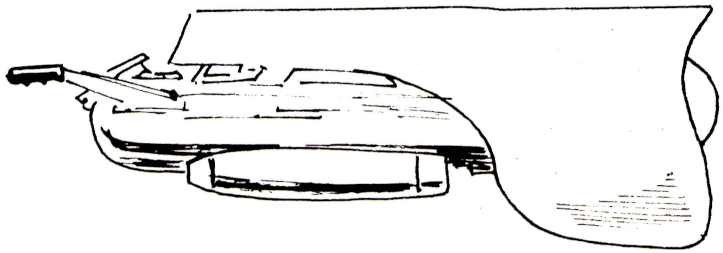
UNDERWATER TRANSPORTATION

Tow Sled: A sled attached by lines to a boat or submarine, with space for equipment and handles for a diver to grasp. The vessel pulls the sled with the diver holding on. Diving planes can allow ascent or descent as needed.

With no internal power, the tow sled cannot move without assistance. During use of a tow sled, roll 1D against diving skill during each ascent or descent to see if a mishap occurs. A mishap on descent results in 1D

damage to the diver (usually a broken ear drum). On ascent, 2D damage resulting from a too-rapid ascent may be experienced. At speeds greater than 5 kph, a diver may lose his face mask on a 1D roll higher than Diving skill, with negative DMs for prolonged or higher speeds.

A tow sled should be rigged with 3 meters of line for every meter of descent planned for maximum efficiency. Weight of the sled (unloaded) is 10 kg. Capacity for carried cargo is 25 kg. Available at Tech Level 6 for CR 20; can be manufactured to order at Tech Levels 2+ for CR 10 if character has mechanical skill and metalworking tools.



Powered Tow Sled: A self-propelled, torpedo-shaped, one-diver propulsion device. The diver grips twin handles (which house propellor during plane, and rudder controls), and is pulled along by the torpedo.

At Tech Level 6, when these devices are first introduced, the limited battery power available holds performance to a maxium speed of 15 meters per combat round, with a total operating time of one hour between rechargings. Weight is 10 kg, price is CR 150.

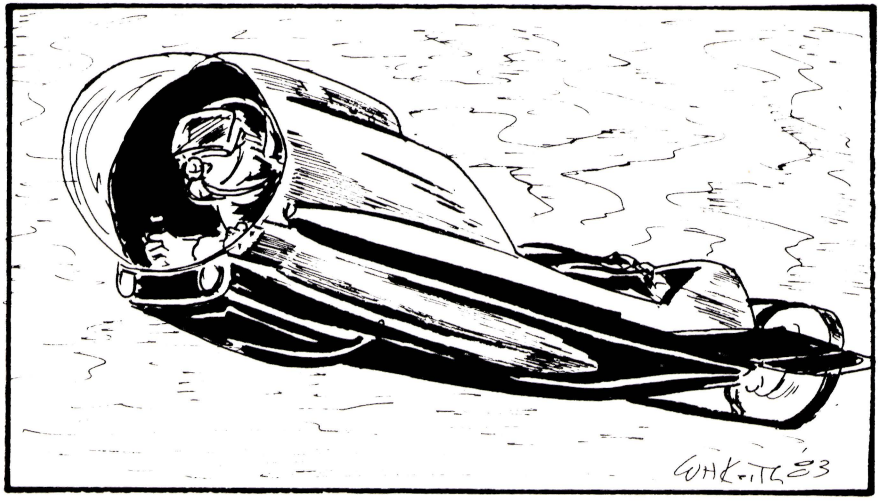
At Tech Level 9, introduction of practical fuel cells reduces the weight of the propulsion system while increasing performance and endurance. Speed is increased to 25 meters per combat round, and endurance to 5 hours between recharges. A cargo capacity inside the torpedo of 5 kg is provided. Total weight is 10 kg, price is CR 250.

Backpack Propulsion System: A propulsion unit clamped to a diver's back. Performance characteristics of the backpack unit are slightly inferior to the powered tow scooter, but the backpack unit does leave the diver's hands free for manipulation.

At Tech Level 7, the BPS unit has a speed of 10 meters per combat round, an endurance of 1 hour before recharge, and a weight of 5 kg. Cost is CR 300.

Tech level 10 models of the BPS increase speed to 20 meters per round, endurance to 3 hours between recharges, and decrease weight to 30 kg. Cost of this model is CR 500.

Sea Sled: A powered "wet submarine" which can carry a diver and equipment for prolonged periods of time. Introduced at Tech Level 7, the sea sled has a speed of 30 meters per combat round, and an endurance of 5 hours. Mounting brackets allow lights and/or a personal weapon (usually a speargun) to be attached. Cargo capacity is one diver plus 50 kg of equipment. Weight is 25 kg, length is 3 meters, price is CR



250. A two-man model, with similar equipment capacity and performance, has a length of 5 meters, a weight of 50 kg, and a price of CR 500.

At Tech Level 8, models of the same size, capacity, and price range have increased speed (40 meters per combat round) and endurance (12 hours before recharge).

Minisub: Small submarines come in a variety of shapes, sizes, and configurations, and a discussion of all these could fill a small volume by itself. A typical minisub, however, can hold two individuals, one of whom must have Small Water Craft (Submersible) skill to operate it. Measuring 7 meters in length, with a beam of 1 meter and a submerged draft of 2 meters, the minisub can dive to a maximum pressure of 30atm, but usually does not go below 20atm in normal usage. Below 30atm, the pressure hull collapses.

Performance characteristics for the minisub are listed at the right. The minisub is equipped with various types of underwater tracking and search equipment, including sonar and hydrophones, plus television cameras, communications equipment (which is limit-ed in range underwater to a radius of about a kilometer), and a mechanical arm for manipulation of objects outside the sub.

MINISUBS

Rate	Speed	Endurance
Full	9 kph	2 hours
Cruise	4 kph	4 hours
Slow	2 kph	10 hours

Dive rate: 1m/sec

Standard minisub designs do not feature airlocks, and make no provision for personnel to leave the vessel. An airlock large enough for one person at a time, can be added at a cost of CR 5,000.

The minisub has a displacement (without ballast) of 2,750 kg, and has a cargo capacity of 150 kg. Available at Tech Level 7, the minisub costs CR 30,000. Larger models, holding more people, are available at considerably higher prices.

UMBILICAL DIVING GEAR

Umbilical Salvage Rig: The classic "hard hat" diving suit, this outfit features a heavy protective suit (equivalent to cloth armor in effects), a helmet that completely encases the head and provides windows to the front and sides, weighted boots, and a weight belt. The umbilical lines include an air hose, a safety line, and a communications wire for surface to diver contact. These lines may be as long as desired, subject to availability and the normal considerations of presure and diver safety. A compressor (see below) or a manually operated hand pump is also required for this rig.

The umbilical salvage rig is subject to considerable hazards when the diver works among overhanging rocks or in submerged wrecks, since the umbilical hoses can be severed in such conditions.

The basic salvage suit weighs 5 kg; the helmet 15 kg; weight belt and boots are normally a total of 20 kilograms. Available at Tech Level 4 and up, for a cost of CR 1,000.

Hookah Diving Rig: The hookah rig is a face mask (rigged for complete facial coverage) connected by air hoses to an external air supply (tanks or a compressor). It is worn with an ordinary wet or dry suit (or other skin diving garb), and several are usually connected to one compressor (the name comes from the resemblence to an ancient Solomani smoking rig). The hookah rig is ordinarily a short-ranged, limited utility outfit used for shallow dives or for excursions outside a submarine or undersea base.

The hookah rig is available at Tech Level 7, weighs 250 grams, and costs CR 150.

Compressor: An air compressor is used to feed surface air, under pressure, to a diver by means of an umbilical air hose. Compressors vary in size and performance, but a typical unit weighs 10 kg, costs CR 350, and is available at Tech Level 5 and higher. Tech 5 - 8 compressors are internal combustion engines; once each hour there is a chance that carbon monoxide exhaust will accidentally be fed to the diver. Roll 10+ for this to occur, DM-1 for each level of Mechanical skill of an attending operator. If carbon monoxide is fed to the diver, he will take 3D damage each combat round for 1D rounds, unless the operator notices (roll Intelligence or less each round, or allow conscious divers to signal the problem) and corrects the problem. At Tech Level 9+, fuel cells replace the internal combustion engine, and the problem is eliminated. Compressors can also be used to fill SCUBA tanks in the field.

Umbilical Air Hose: An air hose, for use with umbilical diving rigs, can be purchased for a cost of CR 5 per meter of hose. Standard lengths are in multiples of 25 meters.

SPECIAL PRESSURE GEAR

Vacc Suit: Standard Vacc Suits can be worn for diving purposes. They keep the diver immune to pressure effects up to pressures of 5atm. Below this depth, the vacc suit is no longer usable. Normal prices and information are in effect. If internal pressure is raised (requiring later decompression), the depth allowable is increased accordingly.

High Pressure Diving Armor: A special, semi-powered armor similar in function to battle dress, high-pressure diving armor keeps the diver immune to pressure effects up to 10atm in excess of internal pressure (if internal pressure is 1atm, the suit will withstand 11atm external pressure); raising internal pressure will allow the suit to handle greater exterior pressures, but will require the diver to decompress. Battle Dress skill or Vacc Suit-3 is required for operation. The armor is equivalent to Combat Armor in defensive characteristics, but does not feature any of the power enhancement abilities of normal battle dress.

Diving armor weighs 20 kg, but has no apparent weight while worn. It costs CR 25,000, and is available at Tech Level 9.

OTHER EQUIPMENT

Decompression Chamber: A semi-portable chamber designed to eliminate decompression stops by the divers. The diver may ascend to the surface directly, but must enter the chamber within 5 minutes. It is then set to the diver's maximum pressure setting, and gradually reduced to zero. Total duration of the decompression period will be equal to the sum of all required stops from the Decompression tables given earlier in this book plus 1 minute for every 20 meters of the diver's total ascent.

Decompression chambers come in various sizes, usually fitted for 2 to 10 divers. Weight is 500 kg per diver, and cost is CR 15,000 per diver.

Many exploratory or research vessels, and most coastal hospitals, are also equipped with permanent decompression chambers that can house 10 or more people.

The decompression chamber can also be used as a recompression chamber for a diver who is suffering from the bends. By placing the bent diver into the recompression chamber and re-pressurizing the nitrogen that is bubbling in his bloodstream, physical damage can be stopped at that point.

The main advantage to having a decompression/recompression chamber aboard the dive vessel, is that long, deep dives can be made without worrying about running out of air on the ascent.

Diver's Cage: A latticework cage designed to allow divers to enter the water in areas infested by hostile life forms. Usually holding two men, the Diver's Cage weighs 25 kg and is available for a cost of CR 50 at Tech Level 4 and up. At the lower tech levels, however, the metals used to build the cage will not be as strong (can break eaiser under attack) and will be more prone to rust. It can be constructed by a character with access to welding tools, metal, and Mechanical-2 skill.

Airlift: A device used extensively in underwater salvage and archeology work. The airlift sucks up mud, sand, and small objects through a hose 250 cm in diameter. The material is carried to the surface, where it is sifted through a mesh which separates out objects of potential value. Unfortunately, breakage of small, fragile objects usually occurs when the airlift is used.

The airlift weighs 10 kilograms, plus 1 kg per 2 meters of hose length. It is available at Tech Level 5 and up, costs CR 400 plus CR 10 per meter of hose length, and requires a character with Mechanical-1 or better for operation.

Sandgun: A portable version of the airlift, the sandgun is used to clear sand away, but not to carry it to the surface for sifting. Unlike the airlift, no Mechanical skill is required for operation. Use of the sandgun will stir up bottom sand and mud and reduce visibility drastically. It weighs 6 kg, costs CR 250, and is available at Tech Level 7 and up.

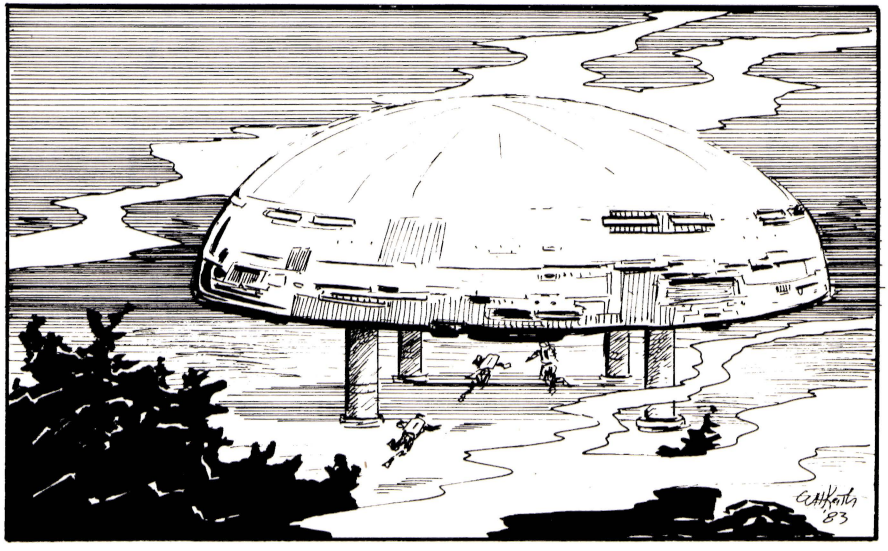
Water Jet: A portable device which sprays a high-pressure water stream. This is also used in salvage and archeology work underwater to displace sand or mud. Use of the water jet stirs up sand and mud and drastically reduces visibility. It weighs 5 kg, costs CR 200, and is available at Tech Level 6 and up.

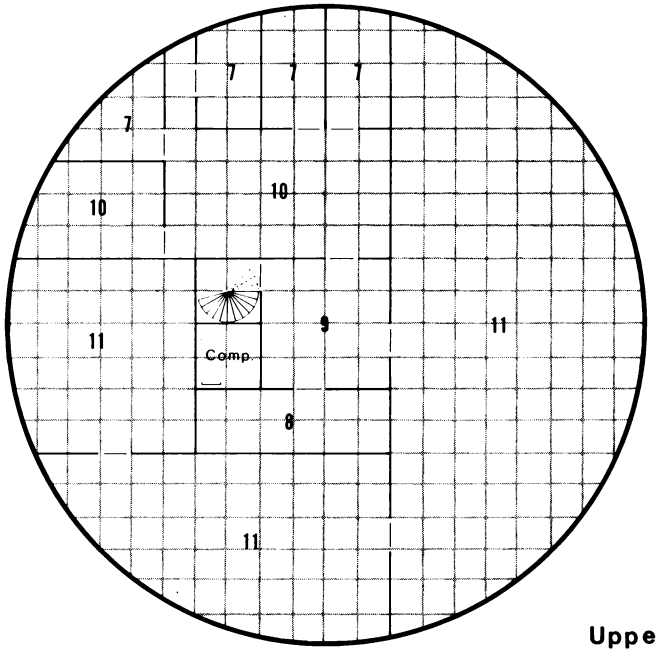
Undersea Habitat: A self-contained eight man laboratory designed for prolonged underwater research and operations. The habitat can be pressurized to very high internal pressures, thus allowing personnel to operate freely in high-pressure diving conditions as necessary.

A two-decked, hemispherical complex, the habitat contains complete facilities for underwater research. The lower deck contains the power plant (1), fuel supplies (2), storage for habitat supplies (3) and an equipment locker for divers (4). The round well at the center (5) is open to the sea, water being held back by internal pressure; this is the entrance to the habitat. A decompression chamber (6, see above), adjacent to the well, is provided for divers who make extended deep dives at depths below the habitat. Stairs lead to the upper deck.

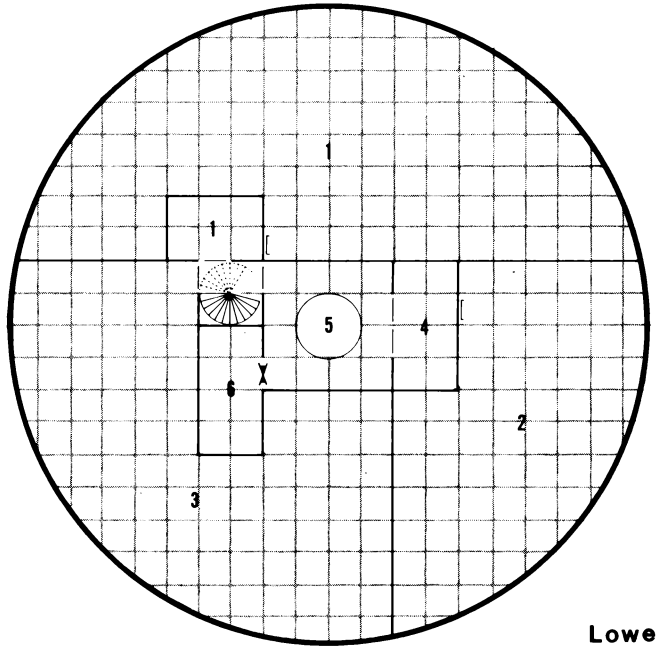
The habitat's upper level contains cramped quarters for eight individuals (7), a control and communications center (8), a small observation area (9), a galley and rec room area (10) and lab spaces (11). A Model/1 computer is installed adjacent to the commo center.

The underwater habitat first appears at Tech Level 7. It weighs 70 tons, and costs CR 7,500,000.





Upper Deck



Lower Deck

Special Encounters and Events

On the pages that follow, some suggestions for potential events for undersea encounter resolutions are presented. These are not, themselves, event or encounter tables, but rather are intended to be inserted into pregenerated or referee-created tables, to lend variety and flavor to an adventure or campaign set in an underwater environment. The suggested events are by no means definitive; referees are urged to add others as they see fit.

EVENT LOCATIONS

A number of basic facts should be understood in using the events listed here.

Rivers are considered to be any narrow body of water flowing from a source to some drainage point - usually a lake or an ocean. They are characterized by strong currents, and are often dangerous as diving sites.

Lakes are relatively small bodies of water, usually fairly placid and calm. Lakes, in these rules, can be taken to include bayous, marshes, backwaters, and even sheltered bays or inlets in a larger body of water.

Offshore areas coastal regions of a large body of water (a very large lake, sea, or ocean). This is usually considered to stretch out around 5 kilometers from land, though such a definition is arbitrary and easily ignored.

Deep water is considered to be a part of a lake, sea, or ocean more than 5 kilometers from shore.

When discussing bodies of water, no distinction is made here between "fresh" versus "salt" water. It is an overall consideration of weather, depth, and general conditions which determines the category in which a given body of water belongs.

In addition to the distinctions above, encounter tables should be separated into at least three categories based on depth. These categories are Shallows, Depths, and Bottom levels.

Shallows are considered to extend to a level of about 10 meters, regardless of pressure considerations.

Depths include any point in the water below this point.

Bottom is the actual bottom of the body of water in question, which often has exceptional flora, fauna, and hazards all its own.

A final facet which should be considered by the referee while creating underwater event tables for any given body of water is the overall character of the area in which dives are to take place. For

example, special hazards posed by arctic conditions will affect ice diving, while the tropical waters of an Earthlike world may share the crystal clarity of Earth's Caribbean. It is very important that these conditions be noted, taken into account, and developed in the course of presenting an undersea adventure.

Format

The event descriptions in this section follow a specific format, as presented below.

NAME OF EVENT (Types of Terrain in which Event Occurs)
Description of event, followed by specific hazards, potential problems, or other instructions. Die rolls for avoidance of, or to trigger, specific occurences, are also included, along with effects of the event.

It should be noted that, in the course of a dive, many different events can occur in the same type of underwater area. The referee should consider implementing a variety of events, rather than limiting a given table to only one specific event. This makes for a more interesting - and far more realistic - adventure.

Undertow (Lake Shallows, Offshore Shallows)
A current underwater pulls the character(s) away from the nearest land at a rate of 2-12 meters per combat round. This movement may not be noticed by the characters affected unless they surface to get a bearing on the shore. Roll Intelligence or less once per round to notice the pull of the current.

The undertow current is a relatively localized occurrence. Increasing or decreasing depth by 1atm will be sufficient to move out of the undertow effects.

Rip Current (Offshore Shallows)
A powerful current pulls the character(s) away from the nearest land at a rate of 3-18 meters per combat round. This movement is noticed only from the surface, or on making a roll of Intelligence or less (one roll allowed per combat round).

The rip current's effects, like those of the undertow, are localized, but in this case, lateral movement, rather than changes in depth, will remove the character from the influence of the current. The current moves outward in a band 1D x 5 meters in width. The referee should determine where within the band the characters are located.

Strong Current (any)
A powerful current runs throughout this level (shallows, depths, or bottom) in a direction determined by the referee. It has a pull of 3-18 meters per combat round, and is always noticeable. When the characters are within the given band, the only way to counter the current is to swim against it. Swimming dead into a current deducts the current's speed from that of the character (and can make him lose ground). Swimming with the current is additive; swimming cross current causes movement with the current and in the direction of the swim. Those with a Diving skill of 2 or better will know how to swim diagonally into the current to achieve a straight line with minimum effort.

Subtle Current (any)

A current pulls divers off course, but is fairly gentle (1-6 meters per combat round) and noticeable only by surfacing and looking around.

Surge Current (any)

A sudden change in current catches the characters and propels them at 3-18 meters per combat round in a direction designated by the referee. Unlike other currents, which remain steady once encountered (unless the character leaves the area of the current), the surge current runs for only 2D combat rounds.

The sudden onset of a surge current (often caused by tides, wakes, tsunami wave effects, etc.) can be most hazardous when characters are swimming near reefs, rock walls, obstructions, or the like. Characters who are near such areas when a tidal surge hits should roll Strength or less to avoid taking 4D damage from being pushed into the obstruction.

Sandy Bottom (any bottom)

The bottom is covered by soft sand. If there is any cause of turbulence within a meter of the bottom (including fast swimming by adventurers), clouds of sand will rise and reduce visibility to 1D meters for several combat rounds (referee determines duration). Sandy bottoms may also conceal camouflaged animal life, sometimes poisonous in nature, which can be stepped on inadvertantly. The referee should design one or more ocean-dwelling animals that might burrow in this fashion, and assign a random probability to encountering one in sandy bottom conditions.

Muddy Bottom (any bottom)

The bottom is composed of a heavy layer of mud. Visibility is automatically reduced to 5 meters range. Any time the mud is physically disturbed (by contact with a person, animal, or object), a thick cloud of mud reduces local visibility to less than 1 meter for 1D minutes. Equipment or artifacts dropped into muddy bottoms can become hopelessly lost.

Rocky Bottom (any bottom)

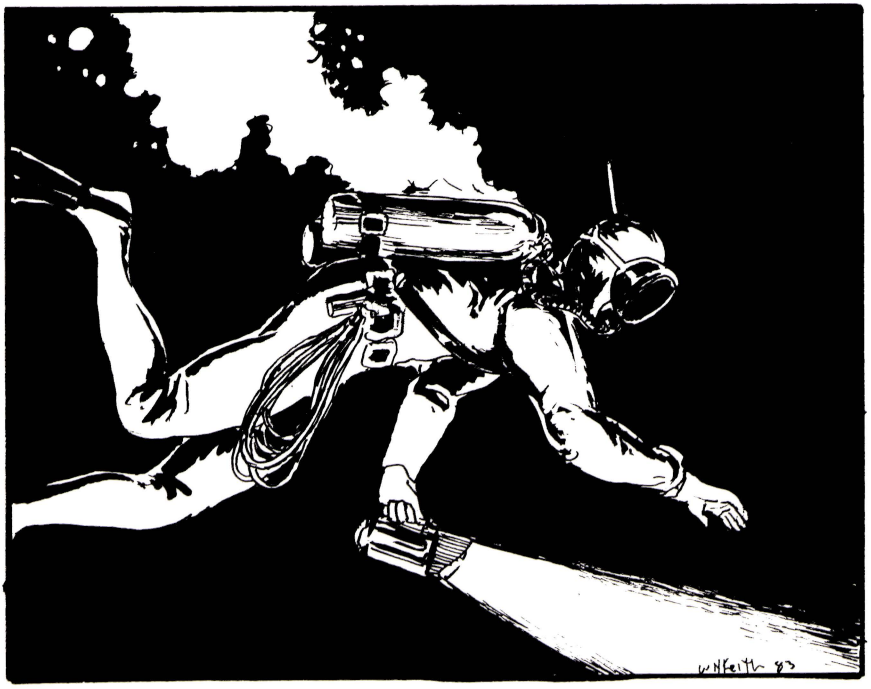
The bottom is covered by numerous rocks and rocky outcroppings. A character swimming along such a bottom may find his foot trapped on a roll of 10+. Sharp, jagged rocks can cause accidental wounds on a roll of 9+; the damage inflicted amounts to 1D hits. Crevasses and recesses among rocks can conceal marine predators, and an extra die roll should be made on encounter tables.

Overhanging Ledge (any bottom)

A rocky, upthrust wall rises above the bottom for several meters. Free divers or SCUBA divers may become disoriented and caught 1D-1 combat rounds on a roll of 8+. While caught, an attempt can be made to get loose once each round by throwing dexterity or less. Successful rolls allow escape; unsuccessful rolls cause the diver to take 1D damage, and may damage carried equipment (referee's choice) on a roll of 7+. Umbilical divers have these problems, but in addition may sever their umbilical lines on a roll of 7+ made once each round that the diver remains in the vicinity of the ledge. An underwater cave (see event) will be discovered near an overhanging ledge on a roll of 9+.

Underwater Cave (any bottom, or see Overhanging Ledges)

A cave opening is discovered leading into a rock wall underwater. Caves often extend deep into the sides of underwater shelves, and in many cases contain chambers which rise above the water level. The referee should be responsible for mapping out the layout of caves discovered underwater.



Cave diving is hazardous. Artificial lighting is required to see anything inside. While exploring a cave, a throw should be made once each combat round to encounter a narrow or awkward point in the passage (or these can be determined by the referee); when such a point is reached, the diver(s) should roll against dexterity to avoid damaging some item of equipment. When ascending in a cave, a diver may receive 1D damage unless a roll equal to or less than diving skill is made on 1D.

Reef Colony (any bottom)

A reef colony is a network of underwater formations created by living animals, which consists of hard, sharp, rocklike structures. The Terrestrial equivalent is coral, but this may take on many other forms on other planets. Reef colonies usually provide food and shelter for other species of sea life, and often are teeming with animals of many kinds. Three times the usual number of encounter rolls should be made while in an area holding a reef colony.

Reefs often contain special dangers. When swimming very close to a reef, jagged edges can inflict 1D damage if brushed against accidentally. This happens on any given round on a 10+. If the diver reaches out to

touch the reef or pick up something in it, roll dexterity or less to avoid damage. Some species may be far more dangerous (like the venomous fire coral on Earth), while others may be less so.

Divers swmming along reefs may also have their feet trapped inadvertantly, as discussed in the Rocky Bottom event section. When this happens, each attempt to pull loose exposes the diver to direct contact with the reef, and damage may be taken.

Entangling Weed (Lake Bottom, any shallows)

A heavy growth of underwater or surface vegetation can trap divers or diver propulsion vehicles. Divers must roll dexterity or less to escape being tangled in weeds; failure means the diver cannot move in any direction. Entangling is automatic; escape rolls are allowed once each round. Other divers may attempt to assist (an extra escape throw is allowed each round for each assisting diver); but these assistants must themselves roll dexterity or less to avoid being trapped along with the original victim.

Any vehicle relying on propellors which enters an area of weed has the propulsion system jammed on a roll of 10+. It takes 2D combat rounds to free up a jammed propellor, DM - Mechanical skill of person clearing the system. There is a chance (10+) that jammed propellors will cause the engine to overheat, requiring a complete surface overhaul to repair the vehicle.

Underwater Geyser (Lake, Offshore, or Deep Water Bottom)

A volcanic vent opens up underwater, water temperature within 20 meters of that geyser outlet becomes 1D levels above that of the normal

water. Geysers may erupt on a roll of 10+ in any particular 30 minute period, inflicting 3D damage on any character within 5 meters due to sudden heat. Areas around geysers may contain dangerous chemicals (on a 9+, determined once for each geyser discovered). These chemicals could cause damage to characters or their equipment, as determined by the referee.

Thermocline (any)

A sudden change in water temperature is encountered. A thermocline is a layer of water much warmer or colder then surrounding conditions. When indicated, it will mean a shift in water temperature of two levels either up or down from the basic water temperature (at the referee's option). A change of pressure of .5atm will bring the diver out of the thermocline layer.

Polynya (Artic shallows only)

A polynya is a gap in the ice, sometimes open water, sometimes slightly covered by a thin layer of ice. When engaged in arctic dives, a polynya is the only way to the surface. If a diver cannot reach a polynya before air runs out, the diver will not survive.

Low-Oxygen Layer (any depth)

A layer of water of low oxygen content is entered. Animal encounters are checked only half as often as long as the diver remains in the area. If using an artificial or bionic gill, anoxia will set in in 1D rounds after entering the area, and the diver is rendered unconscious. See the rules on anoxia in the equipment description of the artificial gill. The low-oxygen layer extends down until the next .5atm increase in pressure, and can cover a fairly wide horizontal area.

Wreck (any bottom)

A sunken seagoing (or space-going) vessel is discovered on the bottom. The referee should determine details of its origins, damage, and potential value. Exploration of wrecks can include the discovery of valuable cargo, pockets of air, and items of potential historical, scientific, or other interest. Artificial light is required inside wrecks. Equipment can be snagged, and umbilical lines torn, as described for overhanging ledges (see above). Wrecks are sometimes inhabited by lurking animal life since they are most often an artificial reef (see Reef Colonies).

Storm (any)

A storm has varying effects. In shallows, the storm sets up surge currents (see above), which are triggered on a roll of 9+ made once every 30 minutes. When on the bottom at pressures of 3atm or less, visibility is reduced to 1-6 meters by mud and silt stirred up from below. Subtle currents will be set up in other areas (see above).

Equipment Malfunction (any)

The referee should always feel free to insert an Equipment Malfunction event. Many pieces of equipment are already provided with information on handling such malfunctions; others can be easily developed as needed. It is up to the referee to determine how an Equipment Malfunction event is to be implemented.

UNDERWATER ENCOUNTERS AND GAME MECHANICS

The rules hitherto have discussed methods from a highly generalized point of view, so that a variety of possibilities can be covered in the simplest way possible. The amount of detail developed by the referee before beginning an underwater adbventure will depend entirely on the referee's desire to invest time before the game begins.

A dive can be conducted using a basic set of encounter tables (shallows, depths, and bottom for the particular body of water), without maps or any other tools, except the referee's descriptive powers and imagination. More often that not, however, the referee will want to map out an area to be explored in advance. In such a case, many of the events given in the previous section will not be random, but instead will be specific "terrain features" on the referee's map.

The referee can specify the nature of the bottom at any given point on his chart. Reef colonies, overhangs, wrecks, caves, and underwater geysers can be located in advance; currents, too, can be plotted. When this is done, a wide variety of encounter tables can be developed - as many as for land adventures. Thus, a specific table for reef colonies, for sandy bottoms, for caves, and so forth can be set up, with appropriate animal life and events to match.

Naturally, a typical stretch of bottom won't have <u>everything</u> discussed previously jumbled together. A little thought should go into preparing a chart . . . pick the items of use to the adventure, and build from there.

A NOTE ON ENCOUNTERS

Submarine environments are often much more densely filled with animal life than an equivalent area of land-based wilderness. Animal encounters should be much more frequent than in other terrain types. A suggested interval of 1 roll per half hour should be made to check encounter possibilities.

On the other hand, really dangerous encounters should not occur each time the die is rolled. Earth divers do not face shark or barracuda attacks constantly, except in unusual conditions. Most marine encounters will be harmless . . . though many can be interesting, and a few threatening.

Adventures in the Undersea Environment

The material presented in this booklet makes it possible for players and referees to put together adventures which elaborately recreate the many hazards and problems of the undersea environment. Not all the rules need be put to use; if it is so desired, however, a very detailed presentation of underwater advbenturing may now be undertaken.

Since such extensive rules are available, it seems proper to outline a few basic adventure suggestions. Operations in the undersea environment can make fascinating, exciting changes of pace from the more normal **Traveller** adventure situation.

WATERWORLDS

Planets with extensive hydrospheres (80% and higher) and technology sufficient to support undersea construction and operation often have major undersea settlements or cities. This is certainly true of many waterworlds, with no significant land masses whatsoever.

On such worlds, diving is a fact of life, as normal to the inhabitants as a walk around the block to the average suburbanite. Around an undersea city, agriculture, mineral exploitation, and many other important activities will take place in the water, and people will have to swim to adequately supervise or undertake such activities.

Adventures on planets of this type need not involve diving (all the action can take place in the conditioned undersea buildings, after all) . . . but can easily be introduced to create an exotic flavor. When the "wilderness" is a reef and the "grazers" are a piscean life form, the players cannot possibly confuse the adventure setting with their home town.

EXPLORATION

A world's oceans, teeming with exotic life and holding numerous untapped resources, are an obvious target for numerous exploratory missions. Whether the search is a generalized survey or a hunt for some specific resource available only from a particular undersea location, numerous adventure situations can be built out of attempts to investigate the depths of an ocean or sea.

ARCHEOLOGY

Remnants of a planet's past can often be found underwater. From sunken ships to lost cities, interesting relics of ancient civilizations can be discovered at the bottom of an ocean. Investigation of underwater

archeological sites can lead adventurers to numerous relics of potential scientific or historical value, or even to lost treasures with a very real monetary value.

Undersea archeology is a far more hazardous undertaking than a tame dig on land. The material in this booklet makes it possible to extensively follow the course of an underwater excavation.

RESCUE

An interesting adventure can be built around the need to rescue the personnel from a crippled submarine, spacecraft, or undersea base which has been cut off on an ocean floor. The need to locate, reach, and gain access to such a group of disaster victims, and get them out safely, would make a fasinating adventure situation, particularly if it must be carried out in the face of dangerous marine life, potentially hazardous events, or intelligent opposition.

SALVAGE

Similar in nature to a rescue mission, underwater salvage missions focus on discovering intact (or relatively intact) wrecks, and then removing artifacts, valuable goods, components, or even the entire wreck to the surface. A downed starship salvaged in this manner could end up as the players' new ship, once suitable repairs are carried out. The underwater setting for the salvage operation merely causes additional hazards and lends an unusual atmosphere to the proceedings.

BIG GAME HUNTING

A safari need not be limited to dry land; it is possible to mount hunting expeditions aimed at killing, capturing, or photographing the denizens of the undersea environment. Adventurers interested in the sport could undertake such dives on their own initiative, or could be hired by a wealthy enthusiast to assist in a hunt.

If desired, hunter characters created by the generation system in Supplement 4, Citizens of the Imperium, should be allowed to take Diving or Swimming skills in lieu or Survival or +1 Strength results. Some hunters may even specialize heavily in undersea hunting, with appropriate effects on their knowledge, experience, background, and skills.

MILITARY MISSIONS

Military or paramilitary adventures are common themes in **Traveller.** The undersea environment merely injects unusual problems and situations into the usual routine. Whether the adventure merely requires a stealthy underwater approach to a beach, or actually places the target deep underwater, the possibilities are intriguing. To ordinary considerations of good tactics must be added the visibility problems underwater, the special hazards encountered in deep or prolonged dives, and special problems inherent in underwater combat.

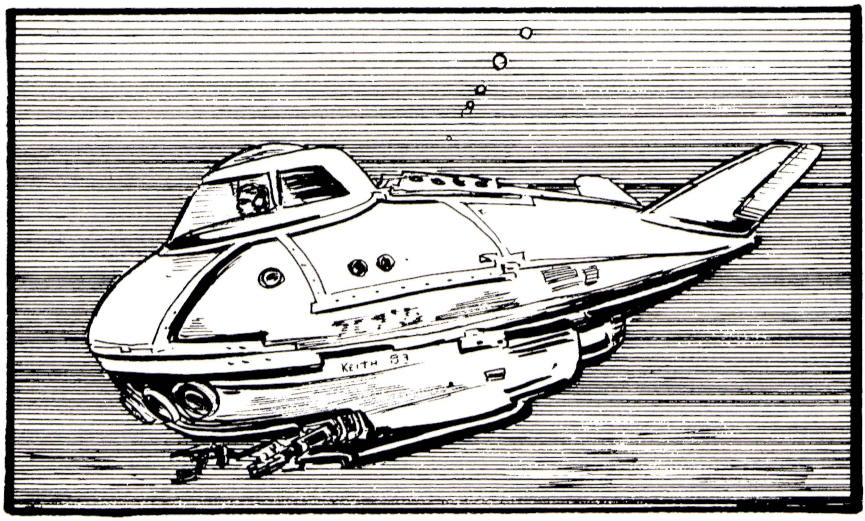
CONTACT

It is not impossible to imagine intelligent life in an aquatic environment. Such life would tend to develop ways of thinking and whole outlooks on civilization quite alien to those we are accustomed to. A mission to contact, or to trade with, such an exotic undersea culture would be interesting even without keeping in mind the problems associated with diving . . . and, with such problems taken into account, the adventures become more unusual and interesting still.

FINAL NOTES

These suggestions and ideas are only the tip of the iceberg, just as the rules, equipment, and events presented in the booklet are themselves representative, rather than definitive, of the many possibilities inherent in the undersea environment. Referees are urged to make use of the material presented here in whatever way best enhances the course of their own **Traveller** games, and are encouraged to introduce additional material if they feel the need to do so.

For those who have a knowledge of diving, additional rules on repetitive dives or the various hazards incurred in making descents or ascents could certainly be brought into play. Further distinctions in available equipment are equally valid . . . and inventiveness in devising further underwater events is almost mandatory. **Traveller** is as much as you care to put into it. We hope this booklet helps show the way.



The Undersea Environment is a **Traveller®** supplement dealing with the particular problems found in an aquatic environment. Included are specific rules systems designed to simulate underwater activities and hazards, explanations of gear and equipment available for underwater use, and a guide to special events and encounters to aid the referee in constructing underwater encounter tables.

Challenge your players to broaden their horizons and enter **The Undersea Environment.**

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